Synthesis and Characterization of 8-(4-Dimethyl amino-phenyl)-9-(6-R-benzothiazol-2-yl)-7-oxa-9-aza-spiro[4.5]decane-6,10-dione and 8-(2- hydroxy-phenyl)-9-(6-R-benzothiazol-2-yl)-7-oxa-9-aza-spiro[4.5]decane-6,10- dione by reaction of 2-Oxa-spiro[3.4]octan-1,3-dionewith(4-Dimethylamino-benzylidene)-(6-R-benzothiazol-2-yl)-amine and 2-[(6-R-benzothiazol-2- ylimino)-methyl]-phenol.

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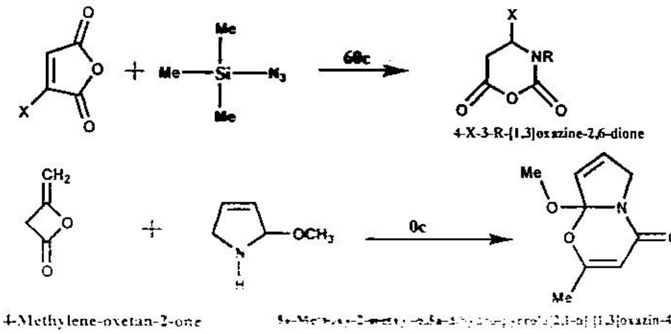
Date of acceptance 26/4/2005

Abstract :-

(4-Dimethylamino –benzylidene)-(6-R-benzothiazol-2-yl)-amine and 2-[(6-R-benzothiazol-2-ylimino)-methyl]-phenol (Schiff bases) were prepared by condensation of 6-R-2-amino benzothiazol with Salicylaldehyde and 4-dimethyl amino benzaldhyde. These Schiff bases were reacted with 2-Oxa-spiro[3.4] octane-1,3-dione by heating with reflux in dry benzene at 80°c for 3hrs.togive a six-member heterocyclic ring system;8-(4-Dimethylamino-phenyl)-9-(-6-R-benzothiazol-2-yl)-7-oxa-9- spiro[4.5] decane-6,10-diones and 8-(2-hydroxy-phenyl)-9-(6-R-benzothiazol 2-yl)-7-oxa-9- spiro[4.5]decane-6,10diones.Thesecompounds react with pyrrolidine to give 1-(Pyrrolidine-1-carbonyl)-cyclopentanecarboxylicacid(4-dimethylamino-phenyl)-hydroxyl-methyl-(6-benzothiazol-2-yl)-amide and1-(Pyrrolidine-1-carbonyl)-cyclopentane carboxilic acid [2-hydroxy-(2-hydroxyl-phenyl)-methyl]-(6-R-benzothiazol-2-yl)-amide.The final products were identified by their m.ps, elemental analyses,IR, and UV-Visible spectra.

Introduction:-

The six –membered heterocyclic ring system: 1,3-oxazine has already been reported and thoroughly reviewed in the literature (1-4). Maleic arylmaleic and substituted maleic anhydrides react with trimethylsilyi azide to give 4- and 5-substituted "oxauraciles": dihydro-1,3-oxazine-2,6-diones (5-6)



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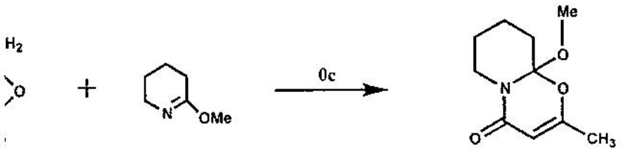
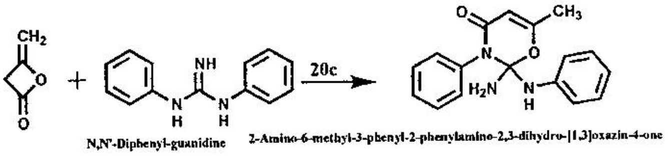
Both 2-methoxypyrroline and 2-methoxypiperdine react with diketene under netural conditions at 0c to give the corresponding,2-methoxydihydro 1,3-oxazine-4-ones (7-8).



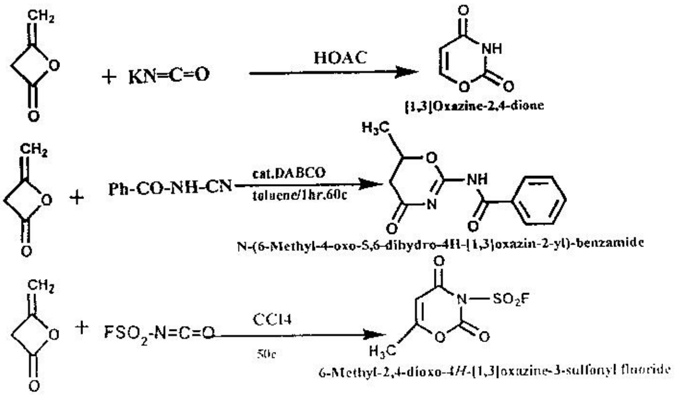
9a-Methoxy-2-methyl-7,8,9,9a-tetrahydro-6H-pyrido[2,1-b][1,3]oxazin-4-one

Diketene reacts with N,N-diphenyl guanidine to give the tranquilizer ketazolam and N- substituted tetrahydro-1,3-oxazine-4-one respectively (9-10).



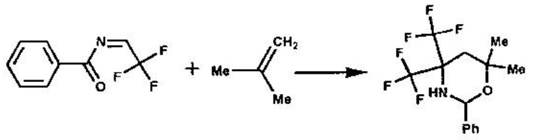
N,N'-Diphenyl-guanidine 2-Amino-6-methyl-3-phenyl-2-phenylamino-2,3-dihydro-[1,3]oxazin-4-one

The reaction of diketene with isocyanic acid, cyanamides and flourosulphinyl isocyanate afforded the corresponding 1,3-oxazine-2,4-diones (11-13).



Ethyl benzimideate,and ethyl butyrimidate react with diketene to give 2-ethoxy-1,3-oxazine-4-ones (14). Imines and N-acyl imines react with diketen to give tetrahydro-1,3-oxazine-4-ones (15-16).

N-acyl imines undergo [4+2] cycloaddition with both-C=C- and hetrodienes. For instance, isolable bis(trifluoromethyl)acyl imine,reacts with 2,2-dimethylethylene to give 1,3-oxazine.



N-(2,2,2-Trifluoro-ethylidene)-benzamide 6,6-Dimethyl-2-phenyl-4,4-bis-trifluoromethyl-[1,3]oxazinane

N-acyl immonium ions have been the most commonly used dienes to effect [4+2] cycloaddition as 4π components with substituted 1,3-butadienes. It is found that N-acylimines or immonium ions that are capable of tautomerization undergo intramolecular Diels-alder reaction to give dihydro-1, 3-oxazines (17)

The reaction of N-Benzylidene 1, 5-dimethyl-2-phenylpyrazolonamines (Schiff bases with Cyclopentane -1, 1-dicarboxylic anhydride to give 2-aryl-3-3(1,5-dimethyl-2-phenylpyrazolo)-1-(5) spirocyclopentyl tetra hydro-1,3-oxazine-4,6-diones (18).

Experimental:-

Melting points were recorded withGallenkamp Melting point Apparataus and were uncorrected. Elemental analysis were carried out with perkin-Elmer,2400;CHN Elemental Analyzer. IR spectra were recorded with PYE UNICAM sp-300 Infrared spectrophotometer by using KBr disc . UV-Visible spectra were recorded (in absolute ethanol) with Schimadsu Recc-160 spectrophotometer.

(4-Dimethylamino –benzylidene)-(6-R-benzothiazol-2-yl)-amine and 2-[(6-R-benzoth-2- ylimino)-methyl]-phenol. (24)

A mixture of 0.01 mole of 2-amino-6-R-benzothiazol and 0.01 mole of salicyldehyde in 20 ml absolute ethanol, was refluxed in water bath for 30 min, then left to cool in ice-water whereby yellow crystalline solid separated out.The solid was filtered, washed with 2%HCl , then with water and recrystallized twice from methanol.

Other Schiff bases were prepared following the same procedure.

8-(4-Dimethylamino-phenyl)-9-(-6-R-benzothiazol-2-yl)-7-oxa-9-spiro[4.5decane-6,10-diones

In a 100 ml round bottom flask equiped with a double surface condenser fitted with calcium chloride guard tube, was placed a mixture of 0.01mol of 4-Dimethylamino – benzylidene)-(6-R-benzothiazol-2-yl)-amine or 2-[(6-R-benzothiazol-2-ylimino)-methyl]-phenol and 0.01mol of 2-Oxa-spiro[3.4] octane-1,3-dione in 20ml of dry benzene . The reaction mixture was refluxed in water bath at 80c for 3hr., the solvent was then removed and the resulting solid was recrystallized from anhydrous THF.

This experimental was repeated using different (Schiff bases) in order to prepare other8-(2-hydroxy-phenyl)-9-(6-R-benzothiazol-2-yl)-7-oxa-9-spiro[4.5]decane-6,10-diones.

Preparation of 1-(carbonyl pyrrolidine) cyclopentane-N-(4-dimethyl amino phenyl)methylol-N-(6-R-benzothiazol-2-yl) amide.

To a mixture of 0.005 mole of 8-(4-Dimethylamino-phenyl)-9-(-6-R-benzothiazol-2-yl)-7-oxa-9-spiro[4.5] decane-6,10-diones. suspended in dry THF, was added an axcess(0.03 mole) of dry pyrolidine . After 10 min of stirring the mixture at room temperature, a clear solution was obtained . The solution was refluxed at (65C°) in water bath for(45min) than left to room temprature and separated product was filtered , washed twice with (5ml) portion of dry THF and recrystallized from dioxane.

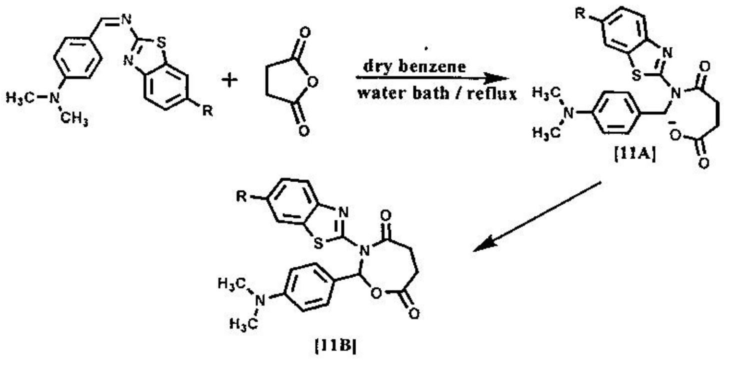
Several other derivatives of 1-(carbonyl pyrrolidine) cyclopentane-N-(4-dimethyl amino phenyl)methylol-N-(6-R-benzothiazol-2-yl) amide and1-(carbonyl pyrrolidine) cyclopentane-N-(2-hydroxy phenyl)methylol-N-(6-R-benzothiazol-2-yl) amide

.were obtained following the same procedure.

Discussion:-

It is known that Schiff bases react smoothly with acid chlorides and anhydrides to give the corresponding addition products$^{(19-21)}$.

In this paper,the reaction of 2-Oxa-spiro[3.4] octane-1,3-dione with(4-Dimethylamino –benzylidene)-(6-R-benzothiazol-2-yl)-amine to give the dipolar intermediate **[11A]** which collapses to the 6- membered hetrocyclic ring system.**[11B]** is presented.



[Schem 1]

This is indicated by the appearance of the characteristic C=O (lacton-lactam) absorption band at $1700cm^{-1}$ in the IR spectra of addition products**[11B]**.

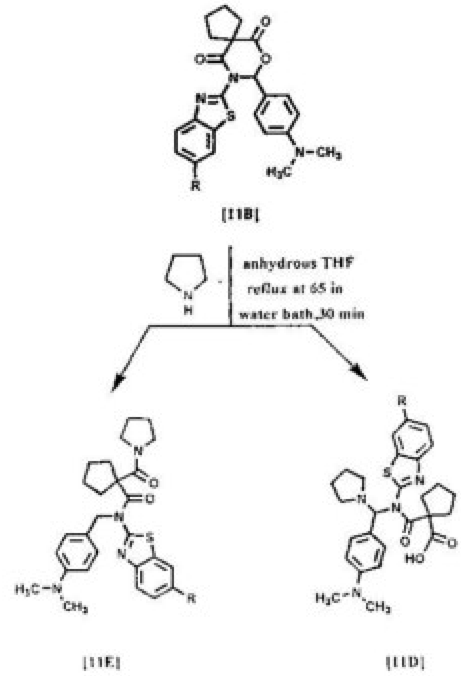
It is impressive to note that the two absorption band at (1800-1950)cm-1 in the IR spactra of pure 2-Oxa-spiro[3.4] octane-1,3-dione (anhydride) have disappeared when the anhydride became part of the 6-membered ring system of the 8-(4-Dimethylamino-phenyl)-9-(-6-R-benzothiazol-2-yl)-7-oxa-9- aza-spiro[4.5] decane-6,10-diones and 8-(2-hydroxy-phenyl)-9-(6-R-benzothiazol-2-yl)-7-oxa-9- aza-spiro[4.5] decane-6,10-diones .The new absorption bands of the (C=O) group in the IR spectra of the addition products [11B] appear at $(1670\text{-}1700)cm^{-1}$. this attributed to the fact that the structures of the addition products are combination of the lacton-lactam structure.

The UV spectra of 8-(4-Dimethylamino-phenyl)-9-(-6-R-benzothiazol-2-yl)-7-oxa-9-aza-spiro[4.5] decane-6,10-diones and 8-(2-hydroxy-phenyl)-9-(6-R-benzothiazol-2-yl)-7-oxa-9- aza-spiro[4.5] decane-6,10-diones show absorption maxima at (240-310)nm , and at (310-445)nm due to charge transfer of the aryl group and the cyclic 6-membered structure **[11B]**.

8-(4-Dimethylamino-phenyl)-9-(-6-R-benzothiazol-2-yl)-7-oxa-9-aza-spiro[4.5] decane-6,10-diones and 8-(2-hydroxy-phenyl)-9-(6-R-benzothiazol-2-yl)-7-oxa-9- aza-spiro[4.5] decane-6,10-diones are identified by their m.ps,elemental analysis (table 1),IR spectra (table 2) and UV spectra (table 3). It is noticeable that the values of C-Hstr. (benzylic) absorption bands are rather high.This is in fact explained by the shift towared longer wavelength, that takes place when the benzylic carbon is linked to three electron-withdrawing groups,phenyl, O and N in the titled compounds.

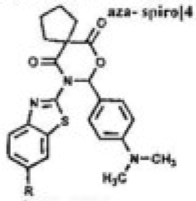
The reaction of 2-Oxa-spiro[3.4] octane-1,3-dione with various Schiff bases is a sort of cycloaddition reaction.Cycloaddition includes ring formation which results from the addition of bonds to either δ or π with formation of new δ bonds.This class of reactions and its reverse encompasses a large number of individual types. Huisgen $^{(22)}$ has formulated a useful classification of diverse cycloaddition in terms the number of the new δ bond . the ring size of the product, and the number of atoms in the components taking part in the cycloaddition . This cycloaddition reaction is classified as a 2 + 5-7, and it is the first cycloaddition of this type , although in principle, one would predict that the butadienyl cation might add to an oleftin through a (4n+2) transition state to yield the cyclohexenyl cation $^{(23)}$.

In an attempt to cleave the 8-(4-Dimethylamino-phenyl)-9-(-6-R-benzothiazol-2-yl)-7oxa9- aza-spiro[4.5] decane-6,10-diones and 8-(2-hydroxy-phenyl)-9-(6-R-benzothiazol-2-yl)7oxa-9-aza-spiro[4.5] decane-6,10-diones are treated with anhydrous pyrrolidene to give the corresponding open-chain1-(Pyrrolidine-1-carbonyl)-cyclopentanecarboxilicacid(4-dimethylamino-benzyl)- (6-benzothiazol-2-yl)-amide and1-(Pyrrolidine-1-carbonyl)-cyclopentanecarboxilicacid (2-hydroxy-benzyl)-(6-R-benzothiazol-2-yl)-amide.Apparently, the reaction involves an acyl-oxygen cleavage of the γ-lactone ring, while the anilide N-C=O- linkage unaffected under these conditions.Since none of the two nitrogen atoms in the resulting products,carries hydrogen , reclosure to the cyclic diamides is not expected.It is also found that the products are insoluble in water,dil.HCl and dil. NaOH solution, which supports structure**[11D]**, rather than the one formed by an alkyl-oxygen cleavage[**11E**], an amino acid which is expected to be soluble in acidic and basic medium.

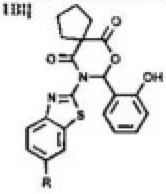


Scheme 2

Table (1) : Some physical and experimental properties of of 8-(4-Dimethylamino- phen yl)- 9-(-6- R-benzothiazol-2-yl)-7-oxa-9- aza- spiro[4.5] decane-6,10-diones [11Ba-11Bf] and 8-(2-hydroxy-phenyl)-9-(6-R-benzothiazol-2- yl)-7-oxa-9- aza- spiro[4 .5] decane-6,10-diones.[11Bg-11Bl]



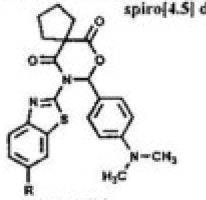
[11Ba-11Bf]



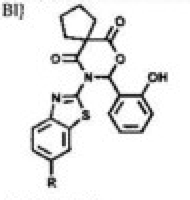
[11Bg-11Bi]

Comp.	R	M.P/ C	Yield%	Molecular formula	Calc.			Found		
					C	H	N	C	H	N
11Ba	CH_3	215	77	$C_{24}H_{25}N_3O_3S$	66.18	5.79	9.65	66.20	7.88	9.54
11Bb	4,6 -CH_3	243	69	$C_{25}H_{27}N_3O_3S$	66.79	6.05	9.35	66.90	5.96	9.33
11Bc	NO_2	188	60	$C_{23}H_{22}N_4O_5S$	59.22	4.75	12.01	59.34	4.80	11.99
11Bd	OCH_3	209	54	$C_{24}H_{25}N_3O_4S$	63.84	5.58	9.31	63.95	5.51	9.26
11Be	Cl	230	61	$C_{23}H_{22}N_3O_3SCl$	60.59	4.86	9.22	60.60	4.89	9.21
11Bf	Br	255	65	$C_{23}H_{22}N_3O_3SBr$	55.20	4.43	8.40	55.35	4.31	8.45
11Bg	CH_3	237	72	$C_{22}H_{20}N_2O_4S$	64.69	4.94	6.86	64.81	5.02	6.77
11Bh	4,6 -CH_3	222	66	$C_{23}H_{22}N_2O_4S$	65.38	5.25	6.63	65.45	5.15	6.57
11Bi	NO_2	211	61	$C_{21}H_{17}N_3O_6S$	57.40	3.90	9.56	57.53	4.05	9.61
11Bj	OCH_3	260	55	$C_{22}H_{20}N_2O_5S$	62.25	4.75	6.60	62.33	4.66	6.53
11Bk	Cl	256	69	$C_{21}H_{17}N_2O_4SCl$	58.81	4.00	6.53	58.76	4.10	6.56
11Bl	Br	245	63	$C_{21}H_{17}N_2O_4SBr$	53.29	3.62	5.92	53.45	3.76	5.82

Table (2): The major IR absorbtions bands (cm^{-1}) of 8-(4-Dimethylamino- phen yl)- 9-(-6- R-benzothiazol-2-yl)-7-oxa-9- aza- spiro[4.5] decane-6,10-diones[11Ba-11Bf]and 8-(2-hydroxy-phenyl)-9-(6-R-benzothiazol-2- yl)- 7-oxa-9- aza- spiro[4.5] decane- 6,10- diones.[11Bg-11Bl]



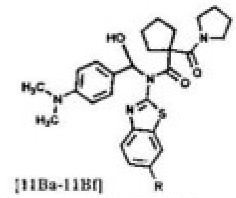
[11Ba-11Bf]



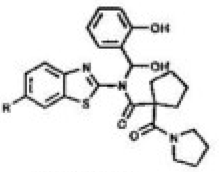
[11Bg-11Bi]

Comp.	O-H str.	C-H str.	C=O str Lacton	C=Ostr. Lactam	C=Cstr.Aromatic	C-N str.	C-O. bend Lacton	Others
11Ba	-----	3220	1670	1650	1600,1570,1470	1360,1020	1290	
11Bb	-----	3230	1670	1655	1580,1550,1460	1350,1010	1280	
11Bc	-----	3220	1680	1640	1590,1560,1470	1380,1030	1300	1365,1540 NO_2
11Bd	-----	3225	1690	1640	1600,1560,1460	1375,1010	1310	1220 C-O-C ether
11Be	-----	3220	1690	1645	1580,1450,1460	1360,1030	1290	790 C-Cl
11Bf	-----	3230	1680	1650	1570,1545,1475	1375,1025	1285	630 C-Br
11Bg	3430	3230	1670	1640	1600,1560,1450	1365,1020	1275	
11Bh	3440	3235	1660	1650	1600,1580,1470	1380,1035	1280	
11Bi	3440	3235	1680	1635	1600,1560,1480	1365,1035	1270	1350,1550 NO_2
11Bj	3430	3235	1690	1635	1590,1550,1480	1370,1020	1290	1210 C-O-C ether
11Bk	3435	3230	1680	1645	1580,1530,1465	1375,1040	1300	770 C-Cl
11Bl	3430	3225	1670	1650	1590,1560,1470,	1370,1040	1300	590 C-Br

Table (3) : Some physical and experimental properties of of 1-(Pyrrolidine-1-carbonyl)- cyclopentanecarboxilicacid(4-dimethylamino- phenyl)- hydroxyl-methyl-(6-benzothiazol-2-yl)-amide and1-(Pyrrolidine-1-carbonyl)-cyclopentane carboxilic acid[2- hydroxy-(2-hydroxyl-phenyl)-methyl]-(6-R- benzothiazol-2-yl)-amide.



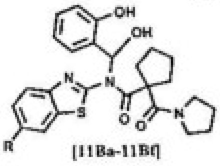
[11Ba-11Bf]



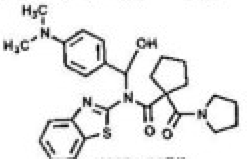
[11Bg-11Bi]

Comp.	R	M.P/C	Yield%	Molecular formula	Calc.			Found		
					C	H	N	C	H	N
11Ea	CH_3	237	66	$C_{28}H_{34}N_4O_3S$	66.64	7.33	10.72	66.70	7.32	10.82
11Eb	4,6 -CH_3	264	69	$C_{29}H_{36}N_4O_3S$	66.89	6.97	10.76	67.00	6.88	10.61
11Ec	NO_2	220	72	$C_{27}H_{31}N_5O_5S$	60.32	5.81	13.03	60.44	5.92	10.11
11Ed	OCH_3	263	58	$C_{28}H_{34}N_4O_4S$	64.34	6.56	10.72	64.50	6.55	10.67
11Ee	Cl	197	62	$C_{27}H_{31}N_4O_3SCl$	61.53	5.93	10.63	61.60	6.02	10.55
11Ef	Br	189	60	$C_{27}H_{31}N_4O_3SBr$	56.74	5.47	9.80	56.83	5.53	9.76
11Eg	CH_3	231	67	$C_{26}H_{29}N_3O_4S$	65.11	6.09	8.76	65.23	6.00	8.85
11Eh	4,6 -CH_3	244	64	$C_{27}H_{31}N_3O_4S$	65.70	6.33	8.51	65.73	6.38	8.58
11Ei	NO_2	237	67	$C_{25}H_{26}N_4O_6S$	58.81	5.13	10.97	58.93	5.07	11.04
11Ej	OCH_3	250	55	$C_{26}H_{29}N_3O_5S$	63.01	5.90	8.48	63.00	6.03	8.52
11Ek	Cl	246	71	$C_{25}H_{26}N_3O_4SCl$	60.05	5.24	8.40	60.11	5.30	8.56
11El	Br	227	73	$C_{25}H_{26}N_3O_4SBr$	55.15	4.81	7.72	55.16	4.80	7.84

Table(4);The major IR absorbtions bands (cm^{-1}) of 1-(Pyrrolidine-1-carbonyl)-cyclopentanecarboxilicacid[(4-dimethylamino- phenyl)- hydroxyl-methyl]-(6-benzothiazol-2-yl)-amide[11Ea-11Ef]and1-(Pyrrolidine-1-carbonyl)- cyclopentane carboxilic acid [2-hydroxy-(2-hydroxyl -phenyl)-methyl]-(6-R-benzothiazol-2-yl)-amide.[11Eg-11El]



[11Ba-11Bf]



[11Bg-11Bi]

Comp.	O-H str. Olefine	O-H str. phenol	C=O str. 3Amide	C=Cstr. Aromatic	C-H bend Benzylic	C-Ostr. Alcohol	C-S str.	Others
11Ea	3450	-----	1680	1580,1490	1400	1360	1240	
11Eb	3455	-----	1670	1590,1520	1410	1350	1250	
11Ec	3460	-----	1670	1580,1510	1415	1365	1245	1355,1540 NO_2
11Ed	3460	-----	1660	1590,1480	1385	1350	1260	1220 C-O-C ether
11Ee	3480	-----	1680	1585,1530	1390	1345	1235	720 C-Cl
11Ef	3440	-----	1650	1590,1520	1400	1335	1240	630 C-Br
11Eg	3490	3355	1665	1580,1540	1410	1330	1250	
11Eh	3450	3345	1685	1570,1510	1420	136	1245	
11Ei	3470	3350	1675	1580,1480	1400	1355	1260	1345,1545 NO_2
11Ej	3460	3340	1670	1570,1530	1395	1350	1255	1210 C-O-C ether
11Ek	3450	3345	1685	1590,1510	1380	1345	1230	710 C-Cl
11El	3480	3360	1670	1590,1485	1390	1330	1250	590 C-Br

Table (5): The UV-Visibl absorption maxima λ/nm of 8-(4-Dimethylamino-phenyl)-9-(-6-R-benzothiazol-2-yl)-7-oxa-9-aza-spiro[4.5[decane-6,10-diones ,8-(2-hydroxy-phenyl)-9-(6-R-benzothiazol-2-yl)-7-oxa-9- aza-spiro[4.5] decane-6,10- diones. [11Ba-11Bl]and1-(Pyrrolidine-1-carbonyl)-cyclopentanecarboxilicacid(4-dimethylamino-phenyl)-hydroxyl-methyl-(6-benzothiazol-2-yl)-amide and1-(Pyrrolidine-1-carbonyl)-cyclopentane carboxilic acid [2-hydroxy-(2-hydroxyl-phenyl)-methyl]-(6-R-benzothiazol-2-yl)-amide.[11Ea-11El]

compound	UV-Visibl absorption maxima λ/nm of oxazepane [11Ba-11Bl]	Comp.	UV-Visibl absorption maxima λ/nm of anilid – pyrrolidides (Amide) [11Ea-11El]
11Ba	350,270,230,220	11Ea	385,310,270,254,222
11Bb	325,265,245,225	11Eb	359,310,268,248,229
11Bc	345,290,260,230,224	11Ec	370,300,260,245,225
11Bd	375,268,259,234,222	11Ed	355,320,268,240,225
11Be	340,280,240,228	11Ee	355,277,252,244,226
11Bf	365,340,275,247,226	11Ef	349,305,267,247,223
11Bg	360,285,250,227	11Eg	359,300,280,254,224
11Bh	340,330,276,240.220	11Eh	344,295,266,242,228
11Bi	338,278,247,227	11Ei	370,276,245,236,228
11Bj	363,255,241,233,221	11Ej	350,289,266,245,227
11Bk	335,278,253,224	11Ek	351,273,265,245,221
11Bl	359,269,249,238,225	11El	359,309,271,248,220

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تحضير ودراسة الخواص التركيبية ل- ٨-(٤-ثنائي أمينو-فنيل)-٩-(٦-معوض-بنزوثيازول-٢-يل(-٧-أوكسا-٩-آزا-سبيرو[٤,٥] ديكان-٦،١٠-دايون و ٨-(٢-هيدروكسي-فنيل) -٩-(٦-معوض-بنزوثيازول-٢-يل(-٧-أوكسا-٩-آزا-سبيرو[٤,٥] ديكان-٦،١٠-دايون من تفاعل ٢-أوكسا- سبيرو [٤,٥] اوكتان-١،٣-دايون مع (٤-ثنائي مثيل أمينو-بنزيل دين)-(٦-معوض-بنزوثيازول-٢-يل)-أمين و ٢[(٦-معوض- بنزوثيازول -٢- يل أمينو)-مثيل]-فينول.

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الخلاصة :-

تم تحضر عدد من(قواعد شيف) بتكاثف ٦-معوض-٢-أمينو بنزوثيازول مع الساليسيل الديهايد و ٤-ثنائي مثيل أمينو بنزلديهايد . فوعلت قواعد شيف هذه مع ٢-أوكسا-سبا يرو [٤.٣] اوكتان-١و٣-دايون بالتصعيد في البنزين الجاف عند درجة ٨٠مْ لثلاث ساعات لتعطي نظام حلقي سداسي غير متجانس: ٨-(٤-ثنائي مثيل أمينو-فنيل)-٩-(٦-معوض-بنزوثيازول-٢-يل)-٧-أوكسا-٩ سبا يرو[٤. ٥] ديكان-٦و١٠-دايون و ٨-(٢-هيدروكسي-فنيل) -٩-(٦-معوض-بنزوثيازول-٢-يل)-٧-أوكسا-٩ سبا يرو[٤. ٥] ديكان-٦و١٠-دايون. تم مفاعلة الأخيرة مع البيرولدين فاعطت مشتقات ١-(بيرو لدين-١-كاربونيل)-سايكلوبنتان كاربوكسيلك أسد(٤-ثنائي مثيل-بنزيل)-(٦-معوض-بنزوثيازول-٢-يل)-امايد و١-(بيرو لدين-١-كاربونيل)-سايكلوبنتان كاربوكسيلك أسد(٢-هيدروكسي-بنزيل) -(٦-معوض-بنزوثيازول-٢-يل)-امايد. وقد شخصت هذه المركبات بواسطة درجات انصهارها وتحليل العناصر الدقيق وأطياف UV.IR, .