SYNTHESIS AND ANTIMICROBIAL ACTIVITY OF 3 -(2-(4*Z*) - 4 - SUBSTITUTED BENZYLIDENE-4,5-DIHYDRO-5-OXO-2-PHENYL IMIDAZOL-1-YL)ETHYL)-6,8- UN / DIBROMO SUBTITUTED-2-SUBSTITUTED QUINAZOLINE-(3*H*)-ONE

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ABSTRACT

6,8-Disubs.anthranilic acid (X=H, Br) ***(1)*** *reacted with acetic anhydride/ benzoyl chloride/ chloro acetyl choride (R_{a-f})to give 2-methyl / phenyl / chloro methyl disubstituted benzooxazine-4-one (X=H, Br) derivatives respectively* ***(2)****. Benzoyl glycine* ***(3)*** *reacts with substituted benzaldehyde* ***(4)*** *derivatives (R'_{1-5}) to give 4 -substituted benzylidene-2-phenyl-oxazolone derivatives* ***(5)****. These on reaction with ethylene diamine in presence of glacial acetic acid gave* ***(6)****. The latter* ***(7)*** *have been synthesized by condensing* ***(2)*** *and* ***(6)****, gave 30 imidazoloquinazoline-4- one derivatives. The structures of the compounds have been confirmed on the basis of their IR, ^{1}HNMR and MS spectral data. All the compounds* ***(7 a-ziv)*** *have been screened for their antimicrobial activities. Most of the compounds have shown promising antibacterial, and antifungal activity.*

Keywords: *Anthranilicacid, Benzooxazineone, quinazoline, Oxazolone, Imidazolone, Antibacterial, Antifungal.*

INTRODUCTION

A series of quinazoline analogs is designed to posses a alkyl, aryl and chloro alkyl functions at position 2, an alkyl amine (ethylene) bridge linked with Oxazole moiety it become Imidazole at position 3, a unsubstituted or dibromo substitution at 6 and 8 of Benzooxazine-4-one act as one pharmacophore. A serious of Oxazolinone analogs, posses phenyl at position 2, H/ O-Cl/ O-OH/ P-(CH_3)N/ P-OCH_3 substituted benzylidene at position 4 and an alkyl amine bridge(n=2) linked with Benzooxazine one moiety, it become quinazoline-4- one at position 1[1-3]. The 1-ethylamino function of Imidazole condensed with 2-methyl/phenyl/chloromethyl-6,8-un/ dibromo substituted Benzooxazine-4-one to give title compound. Methyl / phenyl/ chloromethyl substituents in quinazoline and hetero cyclic moieties like quinazoline and imidazole are known to contribute to the enhancement of the biological activities [4-6] .

The synthetic strategy to synthesize the targets $7_{(a\text{-}ziv)}$ around 30 compounds is depicted in scheme1. In step 1, disubstituted anthranilic acid (X= H or Br) **(1)** were allowed to react with

acetic anhydride / benzoyl chloride in dry pyridine / chloro acetyl chloride in dry benzene and followed by AC_2O in few drops of pyridine for cyclization to produce 6,8- disubstituted (X= H or Br) -2-methyl/phenyl/chloromethyl-4H-benzo [d] [1,3] oxazine-4-one ([X=H]) a, b, c, and ([X=Br]) d,e and f by using standard procedure. In step 2, benzoyl glycine were prepared from benzoyl Chloride and glycine in presence sodium hydroxide and followed by acid neutralization to get benzoyl glycine **(3)**, The benzoyl glycine was subjected to condenced with phenyl/ Dimethyl amino phenyl / O- chloro phenyl/ O-hydroxy phenyl / P-methoxy phenyl aldehyde's **(4)** (R'_{1-5}) in presence of acetic anhydrite and sodium acetate to produce respective (4 E)-4-substituted benzylidene-2- phenyl oxazol-5(4H)- one **(5)**. The oxazole derivative **(5)** was then reacted with ethylene diamine in presence of glacial CH_3COOH to afford the (4E)-1-(2-amino ethyl)-4- benzylidene 2-phenyl-1h- imidazol-5(4H) - one **(6)** [7-9].

In step3, the 6,8- disubstituted-2- methyl/ phenyl chloro methyl- 4H- benzo[d] [1,3] oxazin -4-one **(2)** were reacted with (4E) -1-(2- amino ethyl) – 4- substituted benzylidene-2-phenyl- 1H – Imidazole – 5 (4H)- one**(6)** to yield the title compounds ,structure elucidation of the synthesized intermediates and final products **(7)** was attained by the aid of IR, ^{1}H-NMR and MS spectrometry.

EXPERIMENTAL

The melting points were determined on a MEL-Temp apparatus by open capillary method and are uncorrected. IR spectra (KBr disc) were recorded on Perkin –Elmer 1800 FT-IR spectrophotometer. ^{1}H-NMR spectra ($CDCl_3$) were recorded or Perkin- Elmer R-32 (90 MH_Z) using TMS as internal standard. Mass spectra were measured with a FINIGAN TSQ-70 spectrometer at 70 e.V. purity of the compounds was checked by TLC using silica gel-G plates ,benzene- methanol and benzene- ethyl acetate as developing solvent.

Synthesis of 2-methyl/phenyl/chloromethyl – 4*H* – Benzo[d] [1,3] oxazin – 4 – one (2)

$R_{(a-f)}$: A mixture of disubstituted anthranilic acid (X=H,Br) (1) (0.12 mol) in acetic anhydride in few drops of pyridine (0.2 mol)/ benzoyl Chloride in dry pyridine (0.3 mol)/Chloro acetyl Chloride in drug benzene (0.12 mol) and followed by acetic anhydride (0.3 mol) in pyridine was reflux for 3 hours. The excess solvents were then distilled off under reduced pressure. The reaction mixture was filtered, washed, dried and re-crystallized with absolute ethanol for methyl and phenyl compounds, where as chloro methyl compounds used a mixture of Chloroform and ethyl acetate.

Synthesis of (4Z) – 4 – substituted benzylidene – 2 – phenyl oxazol – 5 (4*H*) - one (5) $R'_{(1-5)}$: Prepared crystalline benzoyl glycire (3) from standard procedures. Place a mixture of redistilled H/ O-Cl/ O-OH/ P-(CH_3)N/ P-OCH_3 substituted benzaldehyde (0.25 mol) (4) with benzoyl glycine (0.25 mol) in acetic anhydride (0.75 mol) and anhydrous Sodium acetate was allowed to heat with constant shaking. As soon as the mixture has liquefied completely, transfer the flask to a water bath and heat for 2 hours. Then add 100 ml of ethanol slowly to the contents to stand for overnight,

wash with ice cold alcohol and then with boiling water, filtered and re-crystallized from Benzene.(5a) , , m.p. 482^{0}k,Yield (85%), M+1 249, IR CM^{-1}-3210,1550 lactone,and 1650 ^{1}H-NMR 7.14 – 7.30 C_6H_5 , 7.3 –7.6 C_6H_5 ,7.6 C_6H_5–CH_2=.

Synthesis of (4Z) – 1 – (2-amino ethyl) – 4 – Substituted benzylidene – 2 – phenyl -1*H*-imidazol –5(4 *H*)– one (6) R^1(1-5): A mixture of (Z) – 2 – Substituted benzylidne – 2 – phenyl oxazolidin – 5- one (0.1 mol) (5) in ethylene diamine (0.1 mol)(6) in presence of glacial acetic acid under anhydrous conditions reflux for 8 hours. The reaction mixture was filtered, dried and re-crystallized from absolute alcohol. (6a), m.p. 642^{0}k,Yield (79%), M+1 291, ^{1}H-NMR

3.26,3.46,0.9,7.3-7.6, IR CM^{-1}-3450,2900,1510,and 1650 , ^{1}H-NMR protons 7.14 – 7.30 C_6H_5 , 7.3-7.6 C_6H_5–CH_2=, , 3.22 CH_2, 2.91 CH_2, 2.0 NH_2, 7.6 C_6H_5–CH_2=.

Synthesis of 3 -(2-(4Z) - 4 - substituted benzylidene-4,5-dihydro-5-oxo-2-phenyl imidazol-1-yl)ethyl)-6,8- un / dibromo subtituted-2-substituted quinazoline-(3H)-one (7)[10] :The title compounds were prepared from (2) (0.1 mol) and (6) (0.1 mol) in presence of glacial acetic acid was refluxed under anhydrous conditions for 8 hours. The reaction mixture was cooled to room temperature, filtered, dried and re-crystallized from absolute alcohol.
(7a), m.p. 907^{0}k,Yield (67%), M+1 434, ^{1}H-NMR 3.26,3.46,0.9,7.3-7.6, IR
CM^{-1}3200,1450,and 1650. The results of Physical and Spectral Data shown in Table-1,and Table-2 respectively.

PHARMACOLOGICAL EVALUATION

ANTIMICROBIAL ACTIVITY [11-13]

All the synthesized compounds were screened for their antibacterial and antifungal activities. For preliminary screening, the antimicrobial tests were carried out by the disc-diffusion method. Using Mueller-Hinton agar (MHA) medium and Sabouraud's dextrose agar (SDA) medium, for bacteria and fungi respectively. The discs (6mm in diameter), impregnated with the test compounds (25μ g/ml/disc for bacteria and 1000 μ g/ml/disc for fungai). Negative controls were prepared using the same solvent (DMSO) employed to dissolve the test compounds. Ofloxacin (25 μ mg/ml/disc) and Clotrimazole (1000 μ g/disc) were used as positive reference standards to determine the sensitivity of each microbial species tested. The inoculated plates were incubated at 37^o C for 24 h and 27^o C for 72 h for bacterial and fungal strains respectively. Antimicrobial activity was evaluated by measuring the diameter of zone of inhibition against test organisms.
Based on the results (Table No.3), it is referred that quinazolone derivatives and have significant inhibition effect on the growth of bacteria like. *Escherichia coli (EC), Pseudomonas aeruginosa(PA) and Bacillus subtilis(BS).* The compounds exhibited good antifungal activity against penicillium expansun(PE), Aspercillus niger (AN), Trichoderma nigorum (TL).

RESULTS AND DISCUSSION

The target compounds 7(a-ziv) were synthesized through the route depicted in the scheme I. Disubstituted anthranilic acid reacts with R (a-f) to give respective substituted benzooxazin-4-one derivatives (2) were confirmed by 0.9 CH_3, 7.5 – 8.1 C_6H_5, 3.4 CH_2 Cl ^{1}H-NMRprotons) Benzoyl glycine (3) reacts with H/ O-Cl/ O-OH/ P-(CH_3)N/ P-OCH_3 substituted benzaldehyde R' $_{(1-5)}$ (4) to give respective substituted oxazoleone derivatives (5), (7.14 – 7.30 C_6H_5 , 7.3 –7.6 C_6H_5 ,7.6 C_6H_5–CH_2=,5.0 OH, 2.85 P-(CH_3)N, 3.73 OCH_3 ^{1}H-NMRprotons) followed by treatment with ethylene diamine yielded corresponding substituted imidazole derivatives (6) (7.14 – 7.30 C_6H_5 , 7.3-7.6 C_6H_5–CH_2=, , 3.22 CH_2, 2.91 CH_2, 2.0 NH_2, 7.6 C_6H_5–CH_2=, 3.73 OCH_3, 5.0 OH ^{1}H-NMRprotons), Finally condensation of (2) and (6) to give respective 7 (a-Ziv) (7.4 – 7.9 C_6H_5, 3.46 CH_2, 3.26 CH_2 , 7.3-7.26 C_6H_5 , 7.6 C_6H_5–CH_2= , 7.14-7.3 C_6H_5 ,3.73 OCH_3, , 5.0 OH ^{1}H-NMR protons) (120.9-147.1 C_6H_5 , 161.5 C=O, 164 CH, 46.9 CH_2, 46.7 CH_2, 46.6 CH_2Cl, 166.6 C=O, 130.4 4-CH in imidazole, 146.5 CH in 2- C_6H_5 , 126.1-130.2 C_6H_5 in imidazole , 108.4 CH 4-benzylidene, 115.8-158.3 C_6H_5 in 4-benzylidene,55.9 OCH_3,40.3 P-(CH_3)N ^{13}C-NMR Protons) in moderate to good yields and this was confirmed by IR, ^{1}HNMR

and MS Spectral Studies. Among quinozolines derivatives have registered good antibacterial activity against EC, PA, BS (Except 7b,7n,7ziv for EC, 7d,7o for PA, 7d,7q,7zi,7zii,7ziv for BS).These prepared quinozolines have shown moderate to significant antifungal activity also against PE, AN, TL(Except 7a,7n,7o for PE, 7v,7ziv for AN, 7h,7p,7q,7x,7zii,7ziv for TL).

TABLE –1: PHYSICAL DATA

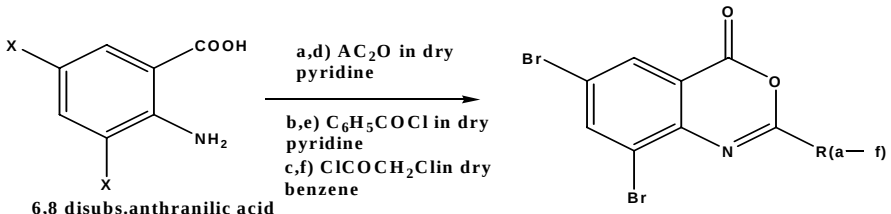
Compd(7)	X	R a-f	R' 1-5	Mol. Formula	M.W.	M.P.(^{0}k)	YIELD (%)
a	H	CH_3	C_6H_5	$C_{27}H_{22}N_4O_2$	434	907	67
b	H	CH_3	$C_6H_4N(C_3)_2$	$C_{29}H_{27}N_5O_2$	477	975	63
c	H	CH_3	C_6H_4Cl	$C_{27}H_{21}ClN_4O_2$	450	949	67
d	H	CH_3	C_6H_4OH	$C_{28}H_{24}N_4O_3$	450	1019	94
e	H	CH_3	$C_6H_4OCH_3$	$C_{28}H_{24}N_4O_3$	464	953	75
f	H	C_6H_5	C_6H_5	$C_{32}H_2N_4O_2$	496	990	72
g	H	C_6H_5	$C_6H_4N(CH_3)_2$	$C_{34}H_{29}N_5O_2$	539	1057	76
h	H	C_6H_5	C_6H_4Cl	$C_{32}H_{23}ClN_4O_2$	531	1032	75
i	H	C_6H_5	C_6H_4OH	$C_{32}H_{24}N_4O_3$	512	1102	74
j	H	C_6H_5	$C_6H_4OCH_3$	$C_{33}H_{26}N_4O_3$	526	1036	78
k	H	CH_2Cl	C_6H_5	$C_{27}H_{21}ClN_4O_2$	468	937	79
l	H	CH_2Cl	$C_6H_4N(CH_3)_2$	$C_{29}H_{26}ClN_5O_2$	512	1005	74
m	H	CH_2Cl	C_6H_4Cl	$C_{27}H_{20}C_{l2}N_4O_2$	503	979	71
n	H	CH_2Cl	C_6H_4OH	$C_{27}H_{21}ClN_4O_3$	484	1049	75
o	H	CH_2Cl	$C_6H_4OCH_3$	$C_{28}H_{23}ClN_4O_3$	498	983	73
p	Br	CH_3	C_6H_5	$C_{27}H_{20}Br_2N_4O_2$	592	1052	79
q	Br	CH_3	$C_6H_4N(CH_3)_2$	$C_{29}H_{25}Br_2N_5O_2$	635	1119	78
r	Br	CH_3	C_6H_4Cl	$C_{27}H_{19}Br_2ClN_4O_2$	626	1094	75
s	Br	CH_3	C_6H_4OH	$C_{27}H_{20}Br_2N_4O_3$	608	1163	84
t	Br	CH_3	$C_6H_4OCH_3$	$C_{28}H_{22}Br_2N_4O_3$	622	1134	84
u	Br	C_6H_5	C_6H_5	$C_{28}H_{22}Br_2N_4O_2$	654	1098	85
v	Br	C_6H_5	$C_6H_4N(CH_3)_2$	$C_{32}H_{27}Br_2N_5O_2$	697	1202	94
w	Br	C_6H_5	C_6H_4Cl	$C_{32}H_{21}Br_2ClN_4O_2$	688	1177	94
x	Br	C_6H_5	C_6H_4OH	$C_{32}H_{22}Br_2N_4O_3$	670	1246	94
y	Br	C_6H_5	$C_6H_4OCH_3$	$C_{33}H_{24}Br_2N_4O_3$	684	1180	91
z	Br	CH_2Cl	C_6H_5	$C_{27}H_{19}Br_2ClN_5O_2$	626	1082	68
zi	Br	CH_2Cl	$C_6H_4(CH_3)_2$	$C_{29}H_{24}Br_2ClN_5O_2$	669	1149	64
zii	Br	CH_2Cl	C_6H_4Cl	$C_{27}H_{18}Br_2Cl_2N_4O_2$	661	1124	61
ziii	Br	CH_2Cl	C_6H_4OH	$C_{27}H_{19}Br_2ClN_4O_3$	642	1193	68
ziv	Br	CH_2Cl	$C_6H_4OCH_3$	$C_{28}H_{21}Br_2ClN_4O_3$	656	1128	67

TABLE-2: SPECTARL DATA

Compd (7)	X	R a-f	R' 1-5	Mol.Formula	M+1	^{1}H- NMR	IR CM^{-1}
a	H	CH_3	C_6H_5	$C_{27}H_{22}N_4O_2$	434	3.26, 3.46, 7.6, 0.9, 7.3 - 7.6	3200, 1450, 1650
b	H	CH_3	$C_6H_4N(C_3)_2$	$C_{29}H_{27}N_5O_2$	477	3.26, 3.46, 7.6, 0.9, 2.82	3200, 3400, 1680
c	H	CH_3	C_6H_4Cl	$C_{27}H_{21}ClN_4O_2$	450	3.26, 3.46, 7.6, 0.9, 7.3 - 7.6	3250, 1480, 1650
d	H	CH_3	C_6H_4OH	$C_{28}H_{24}N_4O_3$	450	3.26, 3.46, 7.6, 0.9, 5.0	3400, 2900, 1700
e	H	CH3	$C_6H_4OCH_3$	$C_{28}H_{24}N_4O_3$	464	3.26, 3.46, 7.6, 0.9, 3.70	3000, 1510, 1680
f	H	C_6H_5	C_6H_5	$C_{32}H_2N_4O_2$	496	3.24, 3.46, 7.6, 7.3 - 7.6	3200, 2900, 1680
g	H	C_6H_5	$C_6H_4N(CH_3)_2$	$C_{34}H_{29}N_5O_2$	539	3.24, 3.46, 7.6, 7.4, 2.85	3200, 3420, 1650
h	H	C_6H_5	C_6H_4Cl	$C_{32}H_{23}ClN_4O_2$	531	3.24, 3.46, 7.6, 7.4, 7.4 - 7.6	3000, 1450, 1650
i	H	C_6H_5	C_6H_4OH	$C_{32}H_{24}N_4O_3$	512	3.24, 3.46, 7.6, 7.3, 5.05	3400, 2900, 1670
j	H	C_6H_5	$C_6H_4OCH_3$	$C_{33}H_{26}N_4O_3$	526	3.24, 3.46, 7.6, 7.3 - 7.6, 3.73	3100, 1470, 1640
k	H	CH_2Cl	C_6H_5	$C_{27}H_{21}ClN_4O_2$	468	3.26, 3.46, 7.6, 3.4, 7.3 - 7.6	3150, 1500, 1650
l	H	CH_2Cl	$C_6H_4N(CH_3)_2$	$C_{29}H_{26}ClN_5O_2$	512	3.26, 3.44, 7.6, 3.4, 2.83	3420, 1520, 1680
m	H	CH_2Cl	C_6H_4Cl	$C_{27}H_{20}C_{l2}N_4O_2$	503	3.23, 3.46, 7.6, 3.4, 7.2 - 7.6	2900, 3000, 1680
n	H	CH_2Cl	C_6H_4OH	$C_{27}H_{21}ClN_4O_3$	484	3.20, 3.46, 7.6, 3.4 - 5.50	3400, 2920, 1650
o	H	CH_2Cl	$C_6H_4OCH_3$	$C_{28}H_{23}ClN_4O_3$	498	3.26, 3.50, 7.6, 3.29, 3.76	3200, 1300, 1680
p	Br	CH_3	C_6H_5	$C_{27}H_{20}Br_2N_4O_2$	592	3.26, 3.46, 7.6, 0.9, 7.3 - 756	3100, 2920, 1650
q	Br	CH_3	$C_6H_4N(CH_3)_2$	$C_{29}H_{25}Br_2N_5O_2$	635	3.26, 3.46, 7.6, 0.9, 2.80	3200, 1400, 3400
r	Br	CH_3	C_6H_4Cl	$C_{27}H_{19}Br_2ClN_4O_2$	626	3.26, 3.45, 7.6, 0.9, 6.68, 7.13	2900, 1470, 1680
s	Br	CH_3	C_6H_4OH	$C_{27}H_{20}Br_2N_4O_3$	608	3.26, 3.46, 7.6, 0.9, 5.05	2920, 1450, 1700
t	Br	CH_3	$C_6H_4OCH_3$	$C_{28}H_{22}Br_2N_4O_3$	622	3.26, 3.46, 7.6, 0.9, 3.77	2100, 1500, 1680
u	Br	C_6H_5	C_6H_5	$C_{28}H_{22}Br_2N_4O_2$	654	3.26, 3.46, 7.6, 7.4, 7.3 - 7.6	3200, 1600, 1700
v	Br	C_6H_5	$C_6H_4N(CH_3)_2$	$C_{32}H_{27}Br_2N_5O_2$	697	3.26, 3.46, 7.6, 7.45 - 7.6, 2.79	3380, 1450, 1650
w	Br	C_6H_5	C_6H_4Cl	$C_{32}H_{21}Br_2ClN_4O_2$	688	3.26, 3.46, 7.6, 6.98, 7.22	3200, 1400, 1700
x	Br	C_6H_5	C_6H_4OH	$C_{32}H_{22}Br_2N_4O_3$	670	3.26, 3.46, 7.6, 7.3 - 7.6, 5.0	3500, 1450, 1720
y	Br	C_6H_5	$C_6H_4OCH_3$	$C_{33}H_{24}Br_2N_4O_3$	684	3.26, 3.46, 7.6, 7.3 - 7.6, 3.77	2900, 1470, 1650
z	Br	CH_2Cl	C_6H_5	$C_{27}H_{19}Br_2ClN_5O_2$	626	3.26, 3.46, 7.6, 3.44, 7.4 - 7.56	2900, 1450, 1700
zi	Br	CH_2Cl	$C_6H_4N(CH_3)_2$	$C_{29}H_{24}Br_2ClN_5O_2$	669	3.26, 3.46, 7.6, 3.40, 2.88	3400, 1500, 1650
zii	Br	CH_2Cl	C_6H_4Cl	$C_{27}H_{18}Br_2Cl_2N_4O_2$	661	3.26, 3.46, 7.6, 3.45, 7.2 - 7.6	3200, 1450, 1650
ziii	Br	CH_2Cl	C_6H_4OH	$C_{27}H_{19}Br_2ClN_4O_3$	642	3.26, 3.46, 7.6, 3.40, 7.3 - 7.6	3450, 1450, 1700
ziv	Br	CH_2Cl	$C_6H_4OCH_3$	$C_{28}H_{21}Br_2ClN_4O_3$	656	3.26, 3.46, 7.6, 3.42, 3.70	2900, 1470, 1650

SCHEME 1

STEP 1



6,8 disubs.anthranilic acid

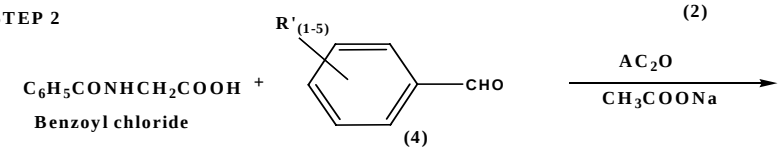
X=H, Br

(1)

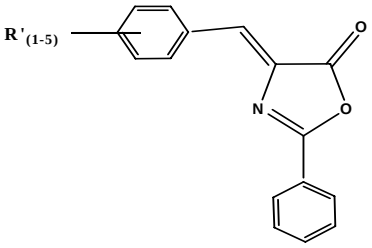
6,8-disubs-methyl/phenyl/chloro methy-4*H*-benzo[*d*][1,3]oxazin-4-one

(2)

STEP 2



(3) **(4)**



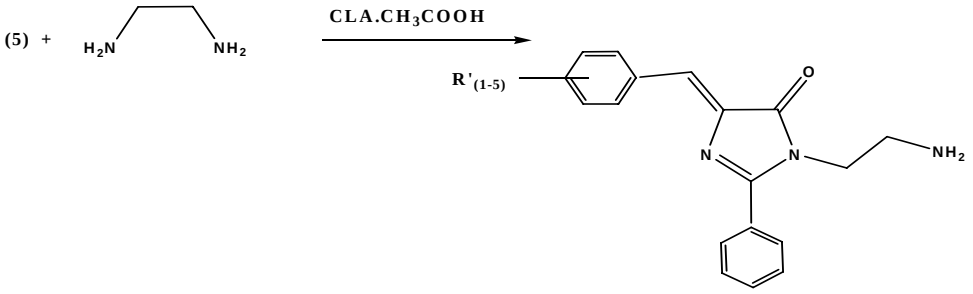
(4*Z*)-4-subs.benzylidene-2-phenyloxazol-5(4*H*)-one

(5)

R'

R'$_1$= H
R'$_2$=(CH$_3$)N
R'$_3$=O-Cl
R'$_4$=O-OH
R'$_5$=P-OCH$_3$

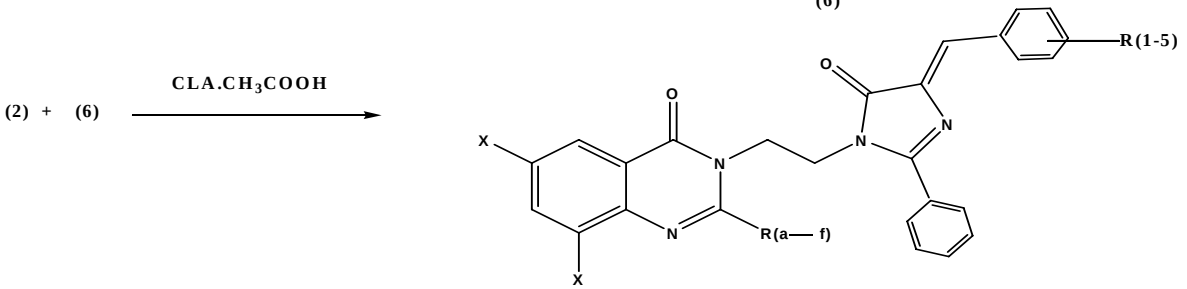
step 3



(4*Z*)-1-(2-aminoethyl)-4-subs.benzylidene-2-phenyl-1*H*-imidazol-5(4*H*)-one

(6)

step 4



3-(2-((19*Z*)-4subs.-benzylidene-4,5-dihydro-5-oxo-2-phenylimidazol-1-yl)ethyl)-6,8-disubs-2-methylquinazolin-4(3*H*)-one

(7)

TABLE-3: ANTIMICROBIAL ACTIVITY

	Anti Bacterial (25 μg / disc)			Anti Fungal (1000 μg / disc)		
Compd(7))	Zone of Inhibition in mm			Zone of Inhibition in mm		
	EC	PA	BS	PE	AN	TL
a	14	16	12	-	67	70
b	-	13	12	83	84	85
c	12	13	14	75	83	84
d	14	-	-	80	81	80
e	13	13	12	65	79	85
f	14	14	13	79	77	85
g	16	12	18	80	75	85
h	12	13	13	80	77	-
i	16	14	12	73	78	79
j	15	18	16	63	79	81
k	11	12	16	81	81	83
l	14	13	13	76	82	84
m	12	16	12	73	83	80
n	-	14	12	-	84	83
o	10	-	14	-	85	85
p	12	13	13	71	86	-
q	13	12	-	63	83	-
r	14	16	12	58	73	84
s	16	12	12	83	72	85
t	14	14	12	81	59	83
u	14	12	13	82	58	80
v	13	16	12	70	-	83
w	11	13	12	71	63	85
x	16	16	13	79	63	-
y	12	14	10	63	77	85
z	18	14	8	62	71	83
zi	18	14	-	65	63	85
zii	18	13	-	68	68	-
ziii	16	14	12	69	69	-
ziv	-	14	-	71	-	79
STD	14	12	20	93	92	90

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