Academic Sciences Asian Journal of Pharmaceutical and Clinical Research

Vol 5, Issue 3, 2012 ISSN - 0974-2441

Research Article

SYNTHESIS AND ANTIMICROBIAL STUDIES OF SOME NOVEL SCHIFF BASES

S. SHAH N. N.*, M. A. BASEER.

P.G. Department of Chemistry , Yeshwant College Nanded (M.S.) (India) , Email: sshahquadri@gmail.com

Received 7 may 2012 :, Revised and Accepted: 23 June 2012

ABSTRACT

A series of Novel Schiff bases were synthesized from 4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl amine by reacting with different aromatic aldehydes via condensation reaction. The newly Synthesized Schiff bases were confirmed by TLC, melting points, IR, ^{1}H-NMR and mass spectra . The compound were evaluated for antibacterial activity against *Bacillus subtilis gr +ve, Pseudomonas aeruginosa gr –ve , Staphylococcus aureus gr +ve, Escherichia coli–ve* and antifungal activity against *Aspergillus niger, Aspergillus Flavus, Curvularia, Alternaria*. All the compounds shows moderate to good activity against different micro-organisms.

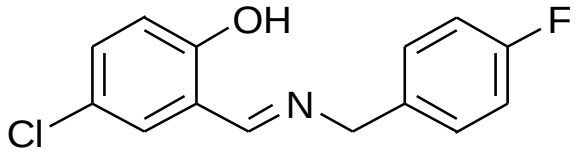
Keywords: 4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl amine, aromatic aldehydes, Schiff bases, antimicrobial activity.

INTRODUCTION

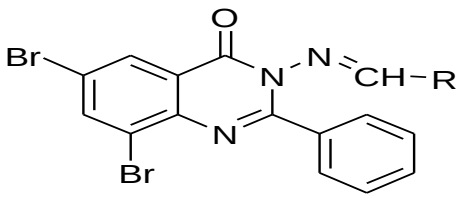
The chemistry of the carbon-nitrogen double bond plays a vital role in progresses of chemistry science[1]. Schiff base exhibit a plethora of bioactivities viz, antitubercular[2] ,anticancer[3] antibacterial[4-11], antifungal[11],analgesic[12], CNS depressant[12], anti-inflammatory[13], anticonvulsant [14], insecticidal [15], plant growth inhibitors [16],anti mouse hepatitis virus (MHV) [17], inhibition of herpes simplex virus type 1 (HSV-1) and adenovirus type 5 (Ad 5)[18], anti mosquito larvae [19] and herbicidal activities [20].Schiff bases are used as protective agent in natural rubber [21].

Schiff's bases includes industrial synthesis of high value life saving beta lactam[22] antibiotics from class of penicillins and cephalosporins. Schiff bases are used as starting material for the synthesis of various bioactive heterocyclic compounds like 4-thiazolidinones, 2-azetidinones, benzoxazines and formazans. Schiff-base compounds have been used as fine chemicals and medical substrates.

Lei-Shi[23] et al has been reported the series of Schiff base by reacting 5-chlorosalicyaldehyde and primary amine reported first among the compound (E)-4-chloro-2-((4-fluorobenzylimino)-methyl)phenol show prominent activity against different antimicrobial strains.

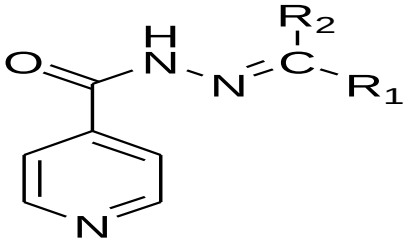


Peral pannerselavam[24] et al reported the novel Schiff base series synthesized by taking condensation of 3-amino-6-8 dibromo 2-phenyl quinozoline-4(3H)-ones with different aromatic aldehyde via cyclized intermediate 6,8 dibromo-2-phenyl benzooxazoline-4-one. Synthesized compound found to be good activity against styphylococous ATCC-9029, Kheliselia pneumonia ATCC-11298 activity by disc diffusion method. Among the synthesized compounds 3-(3,4,5-trimethoxy benzylienamino)-6,8 dibromo-2-phenylquinozoline 4(3H)-one was found to be most active antimicrobial activity with higher MIC values against different strains.



Zeng-Chen liu[25] et al has been reported the two novel 2-oxo-quinoline-3-carbaldehyde (4-hydroxybenzoyl) hydrazones thiosemicarbazone ligand and its corresponding complex of Cu^{+2} were synthesized and screened DNA interaction and antioxidant activity.

Michel J Hearn[26] et al has been reported the vitro and vivo Schiff base of isonizide i.e. isonicotinic acid hydrazide (INH) provide lipoholic adaptation of drug. As a class of these compounds shows high level of activity against mycobacterium tuberculosis in vitro and tuberculosis infected microphases.



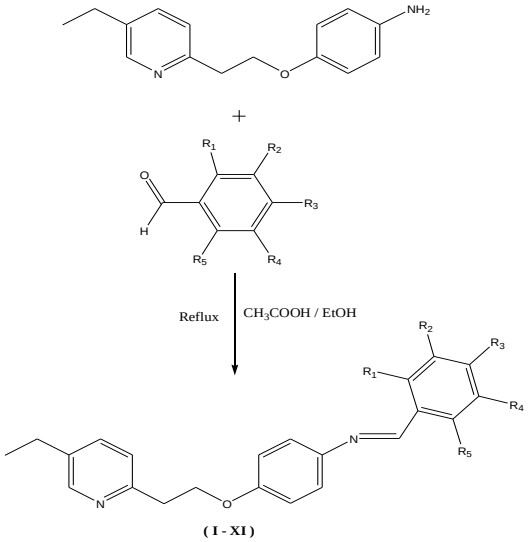
These wide application and diverse potential biological activities of Schiff bases prompted us to synthesize new Schiff bases containing heterocyclic moiety and to as certain their microbial activity.

MATERIAL AND METHODS

Melting points were determined in open capillary tubes and are uncorrected. The purity of the compounds was checked by TLC on silica gel G. UV light or iodine vapour accomplished visualization. The IR Spectra were recorded on FTIR perkin-Elmer 1420 spectrometer and PMR spectra ($CDCl_3$) on a varian-300 MHZ spectrometer using TMS as internal standard. Mass spectra were recorded on VG 7070 H Mass spectrometer at 70 eV.

SYNTHESIS OF SCHIFF BASE, TYPICAL PROCEDURE

Equimolar quantities of 0.01 mole of 4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl amine, and aromatic aldehydes were dissolved in ethanol (20 ml) and 2-3 drop of glacial acetic acid was added and reflux for 2-3 hours. After completion of the reaction (monitored by TLC) , some solvent distilled out, the reaction mixture poured on ice cold water and Solid comes out which is filtered and then recrystalised by ethanol.



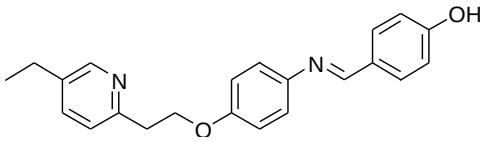
(I - XI)

SCHEME - I : Synthesis of Schiff Bases

Entry	R_1	R_2	R_3	R_4	R_5
I	H	H	OH	H	H
II	OH	Br	H	Br	H
III	H	H	F	H	H
IV	H	NO_2	H	H	H
V	H	H	Br	H	H
VI	OH	I	H	I	H
VII	OH	H	H	H	H
VIII	H	OH	H	H	H
IX	H	H	H	H	H
X	H	H	Cl	H	H
XI	Cl	Cl	H	H	H

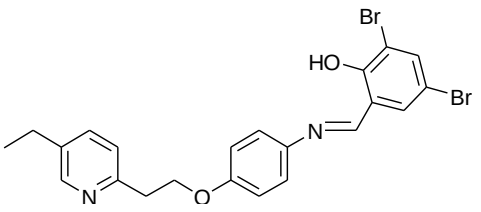
I) synthesis of 4-({4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenylimino}-methyl)-phenol:

Equimolar quantities of 0.01 mole of 4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl amine (2.42gm) , and 4-Hydroxy-benzaldehyde (1.22 gm) were dissolved in ethanol (20 ml) and 2-3 drop of glacial acetic acid was added and reflux for 2-3 hours. After completion of the reaction (monitored by TLC) , some solvent distilled out, the reaction mixture poured on ice cold water and Solid comes out which is filtered and then recrystalised by ethanol.



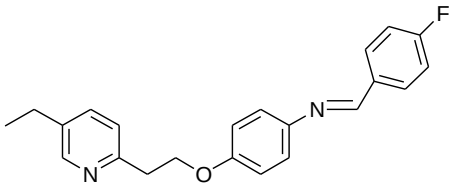
II) Synthesis of 2,4-Dibromo-6-({4-[2-(5-ethyl-pyridin-2-yl)-ethoxy]-phenylimino}-methyl)-phenol:

Condensation of Equimolar quantities of 0.01 mole of 4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl amine (2.42gm) and 3,5-Dibromo-2-hydroxy-benzaldehyde (2.77 gm) , 2,4-Dibromo-6-({4-[2-(5-ethyl-pyridin-2-yl)-ethoxy]-phenylimino}-methyl)-phenol was obtained by the above procedure.



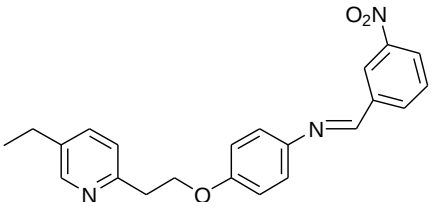
III) Synthesis of {4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl}-(4-fluoro-benzylidene)-amine :

Condensation of Equimolar quantities of 0.01 mole of 4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl amine (2.42gm) and 4-Fluoro-benzaldehyde (1.24 gm) , {4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl}-(4-fluoro-benzylidene)-amine was obtained by the above procedure.



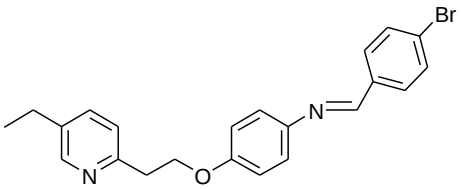
IV) Synthesis of {4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl}-(3-nitro-benzylidene)-amine :

Condensation of Equimolar quantities of 0.01 mole of 4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl amine (2.42gm) and 3-Nitro-benzaldehyde (1.51 gm) , {4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl}-(3-nitro-benzylidene)-amine was obtained by the above procedure.



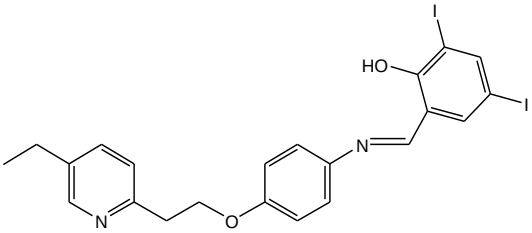
V) Synthesis of (4-Bromo-benzylidene)-{4-[2-(5-ethyl-pyridin-2-yl)-ethoxy]-phenyl}-amine :

Condensation of Equimolar quantities of 0.01 mole of 4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl amine (2.42gm) and 4-Bromo-benzaldehyde (1.85 gm) , (4-Bromo-benzylidene)-{4-[2-(5-ethyl-pyridin-2-yl)-ethoxy]-phenyl}-amine was obtained by the above procedure.



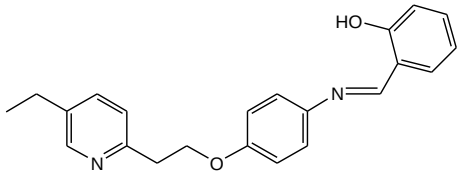
VI) Synthesis of 2-({4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenylimino}-methyl)-4,6-diiodo-phenol :

Condensation of Equimolar quantities of 0.01 mole of 4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl amine (2.42gm) and 2-Hydroxy-3,5-diiodo-benzaldehyde (3.739 gm) , 2-({4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenylimino}-methyl)-4,6-diiodo-phenol was obtained by the above procedure.



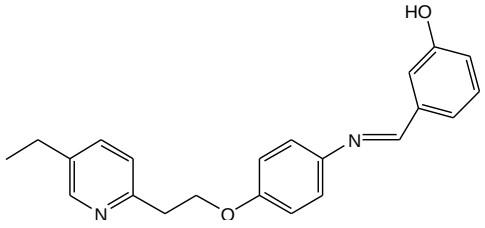
VII) Synthesis of 2-({4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenylimino}-methyl)-phenol :

Condensation of Equimolar quantities of 0.01 mole of 4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl amine (2.42gm) and 2-Hydroxy-benzaldehyde (1.22 gm) , 2-({4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenylimino}-methyl)-phenol was obtained by the above procedure.



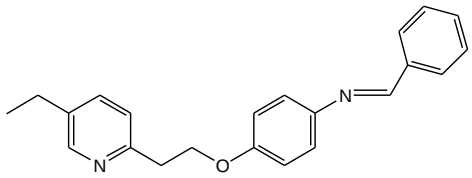
VIII) Synthesis of 3-({4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenylimino}-methyl)-phenol :

Condensation of Equimolar quantities of 0.01 mole of 4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl amine (2.42gm) and 3-Hydroxy-benzaldehyde (1.22 gm) , 3-({4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenylimino}-methyl)-phenol was obtained by the above procedure.



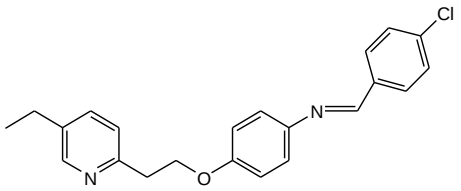
IX) Synthesis of Benzylidene-{4-[2-(5-ethyl-pyridin-2-yl)-ethoxy]-phenyl}-amine :

Condensation of Equimolar quantities of 0.01 mole of 4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl amine (2.42gm) and Benzaldehyde (1.06 gm), Benzylidene-{4-[2-(5-ethyl-pyridin-2-yl)-ethoxy]-phenyl}-amine was obtained by the above procedure.



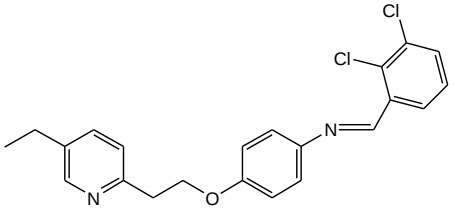
X) Synthesis of (4-Chloro-benzylidene)-{4-[2-(5-ethyl-pyridin-2-yl)-ethoxy]-phenyl}-amine :

Condensation of Equimolar quantities of 0.01 mole of 4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl amine (2.42gm) and 4-Chloro-benzaldehyde (1.40 gm) , (4-Chloro-benzylidene)-{4-[2-(5-ethyl-pyridin-2-yl)-ethoxy]-phenyl}-amine was obtained by the above procedure.



XI) Synthesis of (2,3-Dichloro-benzylidene)-{4-[2-(5-ethyl-pyridin-2-yl)-ethoxy]-phenyl}-amine :

Condensation of Equimolar quantities of 0.01 mole of 4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl amine (2.42gm) and 2,3-Dichloro-benzaldehyde (1.75 gm) , (2,3-Dichloro-benzylidene)-{4-[2-(5-ethyl-pyridin-2-yl)-ethoxy]-phenyl}-amine was obtained by the above procedure.



RESULTS AND DISCUSSIONS

The Schiff base formation is the condensation reaction between aldehyde and amine. Here we have used the 4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl amine and different substituted aldehydes to form the novel Schiff bases.

The condensation reaction is carried out in ethanol solvent in presence of 2-3 drops of acetic acid as a catalyst. Reaction took 2 to 3 hours for completion and gives a good yield of Schiff base.

Physical data of all the synthesized compounds is mentioned in **table-1**.

Table 1: Physical data of synthesized

Schiff base compounds (I-XI)

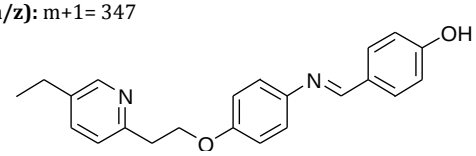
Entry	Molecular formula	Yield (%)	Melting point (°C)
I	$C_{22}H_{22}N_2O_2$	87	165
II	$C_{22}H_{20}Br_2N_2O_2$	88	98
III	$C_{22}H_{21}FN_2O$	86	74
IV	$C_{22}H_{21}N_3O_3$	85	82
V	$C_{22}H_{21}BrN_2O$	88	145
VI	$C_{22}H_{20}I_2N_2O_2$	87	158
VII	$C_{22}H_{22}N_2O_2$	78	112
VIII	$C_{22}H_{22}N_2O_2$	82	172
IX	$C_{22}H_{22}N_2O$	84	90
X	$C_{22}H_{21}ClN_2O$	92	123
XI	$C_{22}H_{20}Cl_2N_2O$	91	110

The structure of the synthesized compounds was confirmed by IR, ^{1}H NMR and Mass . All the compounds give the characteristic IR peaks that proved that the presence of particular functional group, ^{1}H NMR helps to find out the number of Hydrogen atom and their environment and mass spectroscopy helps to find the molecular weight of the synthesized compounds.

Spectroscopic data of all the synthesized compounds is mentioned below

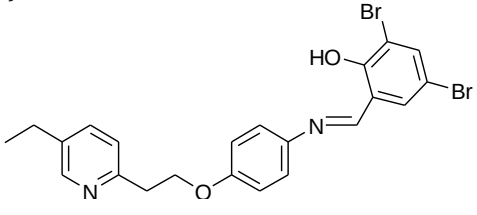
I)4-({4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenylimino}-methyl)-phenol:

M.F.: $C_{22}H_{22}N_2O_2$
IR (KBr): 1646 cm^{-1}(C=N), 2960 cm^{-1} 2850cm^{-1}(CH_3), 3194 cm^{-1}(OH), 1046 cm^{-1} (C-O-C).
^{1}HNMR: δ 1.17 (t,3H,CH_3), δ 2.65 (q,2H,CH_2), δ 3.14 (t,2H,CH_2), δ 4.34 (t,2H,CH_2), δ 5.55 (s, 1H, OH), δ 7.0-8.7 (m,11H,Ar-H), δ 8.55 (s,1H,CH=N):
M.S. (m/z): m+1= 347



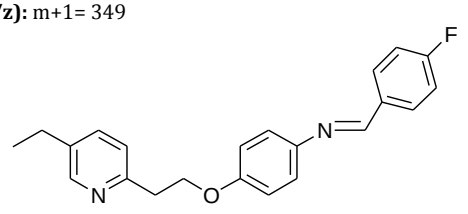
II)2,4-Dibromo-6-({4-[2-(5-ethyl-pyridin-2-yl)-ethoxy]-phenylimino}-methyl)-phenol:

M.F.: $C_{22}H_{20}Br_2N_2O_2$
IR (KBr): 1648 cm^{-1}(C=N), 2958 cm^{-1} 2860cm^{-1}(CH_3),3177 cm^{-1}(OH) , 1045 cm^{-1} (C-O-C).
^{1}HNMR: δ 1.16 (t,3H,CH_3), δ 2.6 (q,2H,CH_2), δ 3.14 (t,2H,CH_2), δ 4.35 (t,2H,CH_2), δ 7.0-8.7 (m,9H,Ar-H), δ 8.5 (s,1H,CH=N), δ11.01 (s, 1H, OH),
M.S. (m/z): m+1= 505



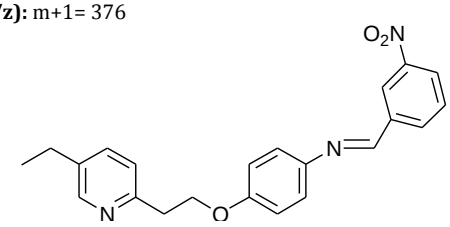
III){4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl}-(4-fluoro-benzylidene)-amine :

M.F.: $C_{22}H_{21}FN_2O$
IR (KBr): 1643cm^{-1}(C=N), 2955 cm^{-1} 2856cm^{-1}(CH_3), 1055cm^{-1}(C-F) 1045 cm^{-1} (C-O-C).
^{1}HNMR: δ 1.15 (t,3H,CH_3), δ 2.59 (q,2H,CH_2), δ 3.14 (t,2H,CH_2), δ 4.34 (t,2H,CH_2), δ 7.0-8.7 (m,11H,Ar-H), δ 8.45 (s,1H,CH=N):
M.S. (m/z): m+1= 349



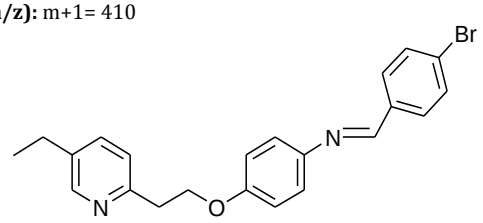
IV){4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl}-(3-nitro-benzylidene)-amine :

M.F.: $C_{22}H_{21}N_3O_3$
IR (KBr): 1649cm^{-1}(C=N), 2960 cm^{-1} 2857cm^{-1}(CH_3), 1352cm^{-1}(NO_2), 1040 cm^{-1} (C-O-C).
^{1}HNMR: δ 1.15 (t,3H,CH_3), δ 2.6 (q,2H,CH_2), δ 3.15 (t,2H,CH_2), δ 4.35 (t,2H,CH_2), δ 7.0-8.7 (m,11H,Ar-H), δ 8.5 (s,1H,CH=N):
M.S. (m/z): m+1= 376



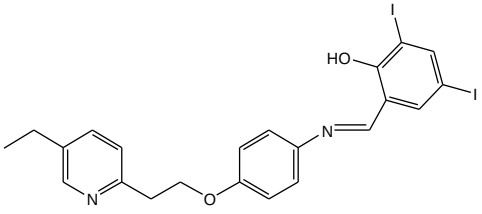
V) (4-Bromo-benzylidene)-{4-[2-(5-ethyl-pyridin-2-yl)-ethoxy]-phenyl}-amine:

M.F.: $C_{22}H_{21}BrN_2O$
IR (KBr): 1643cm^{-1}(C=N), 2945 cm^{-1} 2865cm^{-1}(CH_3), 1046 cm^{-1} (C-O-C).
^{1}HNMR: δ 1.14 (t,3H,CH_3), δ 2.55 (q,2H,CH_2), δ 3.14 (t,2H,CH_2), δ 4.35 (t,2H,CH_2), , δ 7.0-8.7 (m,11H,Ar-H), δ 8.5 (s,1H,CH=N):
M.S. (m/z): m+1= 410



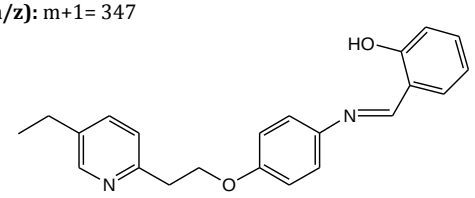
VI)2-({4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenylimino}-methyl)-4,6-diiodo-phenol :

M.F.: $C_{22}H_{20}I_2N_2O_2$
IR (KBr): 1648 cm^{-1}(C=N), 2963 cm^{-1} 2859cm^{-1}(CH_3), 3233 cm^{-1}(OH) , 1045 cm^{-1} (C-O-C).
^{1}HNMR: δ 1.16 (t,3H,CH_3), δ 2.6 (q,2H,CH_2), δ 3.15 (t,2H,CH_2), δ 4.35 (t,2H,CH_2), δ 7.0-8.7 (m,9H,Ar-H), δ 8.5 (s,1H,CH=N), δ11.01 (s, 1H, OH):
M.S. (m/z): m+1= 599



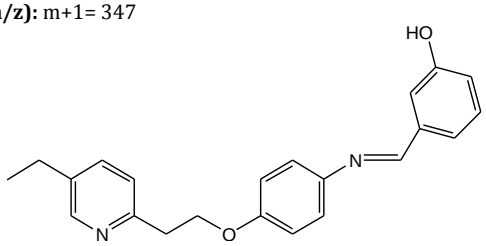
VII)2-({4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenylimino}-methyl)-phenol :

M.F.: $C_{22}H_{22}N_2O_2$
IR (KBr): 1652 cm^{-1}(C=N), 2950 cm^{-1} 2867cm^{-1}(CH_3), 3230 cm^{-1}(OH) , 1046 cm^{-1} (C-O-C).
^{1}HNMR: δ 1.18 (t,3H,CH_3), δ 2.7 (q,2H,CH_2), δ 3.16 (t,2H,CH_2), δ 4.4 (t,2H,CH_2), δ 7.0-8.7 (m,11H,Ar-H), δ 8.7 (s,1H,CH=N),δ11.01 (s, 1H, OH):
M.S. (m/z): m+1= 347



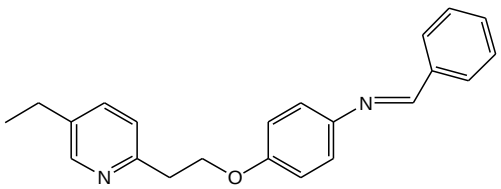
VIII)3-({4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenylimino}-methyl)-phenol :

M.F.: $C_{22}H_{22}N_2O_2$
IR (KBr): 1650 cm^{-1}(C=N), 2958 cm^{-1} 2860cm^{-1}(CH_3), 3177 cm^{-1}(OH) , 1040 cm^{-1} (C-O-C).
^{1}HNMR: δ 1.16 (t,3H,CH_3), δ 2.6 (q,2H,CH_2), δ 3.15 (t,2H,CH_2), δ 4.35 (t,2H,CH_2), δ 5.55 (s, 1H, OH), δ 7.0-8.7 (m,11H,Ar-H), δ 8.5 (s,1H,CH=N):
M.S. (m/z): m+1= 347



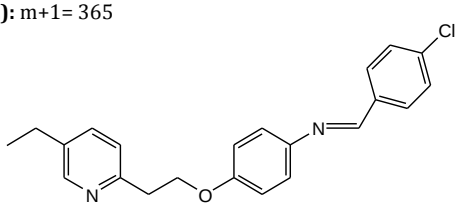
IX) Benzylidene-{4-[2-(5-ethyl-pyridin-2-yl)-ethoxy]-phenyl}-amine :

M.F.: $C_{22}H_{22}N_2O$
IR (KBr): 1636cm^{-1}(C=N), 2959 cm^{-1} 2867cm^{-1}(CH_3),1046 cm^{-1} (C-O-C).
^{1}HNMR: δ 1.15 (t,3H,CH_3), δ 2.6 (q,2H,CH_2), δ 3.1 (t,2H,CH_2), δ 4.3 (t,2H,CH_2), δ 7.0-8.5 (m,12H,Ar-H), δ 8.35 (s,1H,CH=N):
M.S. (m/z): m+1= 331



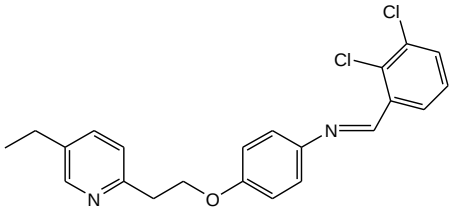
X) (4-Chloro-benzylidene)-{4-[2-(5-ethyl-pyridin-2-yl)-ethoxy]-phenyl}-amine :

M.F.: $C_{22}H_{21}ClN_2O$
IR (KBr): 1640cm^{-1}(C=N), 2966 cm^{-1} 2867cm^{-1}(CH_3), 755cm^{-1}(C-Cl), 1046 cm^{-1} (C-O-C).
^{1}HNMR: δ 1.15 (t,3H,CH_3), δ2.6 (q,2H,CH_2), δ 3.15 (t,2H,CH_2), δ 4.35 (t,2H,CH_2), δ 7.0-8.9 (m,11H,Ar-H), δ 8.4 (s,1H,CH=N):
M.S. (m/z): m+1= 365



XI)(2,3-Dichloro-benzylidene)-{4-[2-(5-ethyl-pyridin-2-yl)-ethoxy]-phenyl}-amine :

M.F.: $C_{22}H_{20}Cl_2N_2O$
IR (KBr): 1640cm^{-1}(C=N), 2960 cm^{-1} 2857cm^{-1}(CH_3), 755cm^{-1}(C-Cl), 1046 cm^{-1} (C-O-C).
^{1}HNMR: δ 1.15 (t,3H,CH_3), δ 2.6 (q,2H,CH_2), δ 3.15 (t,2H,CH_2), δ 4.35 (t,2H,CH_2), δ 7.0-8.9 (m,10H,Ar-H), δ 8.4 (s,1H,CH=N):
M.S. (m/z): m+1= 400



Biological Screening

For establishment of antimicrobial activity of the synthesized compounds we utilized the reported cup plate method. [27-28] The experiment is performed at a concentration of 100µg/ml. we checked the activity of these molecules against different strains of bacteria and fungi as mentioned in table 2. DMSO was used as solvent control. The obtained data of activity of all these tested compounds is shown in **table 2**.

Table2: Antimicrobial activity of synthesized Schiff base compounds (I-XI).

Product	Bacteria (Zone of Inhibition in mm)				Fungi (Zone of Inhibition in mm)			
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**
I	15	10	---	12	---	12	---	---
II	26	22	27	25	20	10	---	08
III	12	09	13	18	12	---	10	11
IV	15	10	24	14	10	---	14	12
V	17	---	---	---	09	13	---	---
VI	26	28	23	34	23	19	34	25
VII	21	10	11	---	---	---	11	---
VIII	16	---	---	17	---	---	12	---
IX	---	17	---	---	---	---	---	---
X	---	16	---	---	---	---	---	---
XI	---	---	---	---	16	12	---	---

A= *Bacillus subtilis gr +ve*, B= *Pseudomonas aeruginosa gr –ve,* C= *Staphylococcus aureusgr +ve,* D= *Escherichia coli gr –ve,* E= *Aspergillus niger,* F= *Aspergillus Flavus,* G= *Curvularia* H= *Alternaria.*

CONCLUSION

In conclusion, we put forth here some novel Schiff bases using 4-[2-(5-Ethyl-pyridin-2-yl)-ethoxy]-phenyl amine and different aromatic aldehydes .The reaction was clean and the products were obtained in excellent yields without formation of any side products. The synthesized compounds were characterized by TLC, melting point, IR, ^{1}H NMR and Mass spectroscopy. The results obtained from this study confirmed that the product has formed. The compounds were evaluated for antibacterial activity against *Bacillus subtilis gr +ve, Pseudomonas aeruginosa gr –ve , Staphylococcus aureus gr +ve, Escherichia coli–ve* and antifungal activity against *Aspergillus niger, Aspergillus Flavus, Curvularia, Alternaria*. All the compounds shows moderate to good activity against different micro-organisms.

The synthesized Schiff bases can be converted into azetidinone, thiazolidinone, benzoxazines and formazans, such type of derivatives of synthesized Schiff bases can increase the antimicrobial activity.

ACKOWLEDGEMENT

The authors are thankful to Principal Yeshwant College Nanded and also to Director IICT Hyderabad for providing lab and spectral analysis facilities for the research work.

REFERENCES

1. S. Patai, The Chemistry of the carbon-nitrogen double bond. John Wiley & Sons Ltd., London,1970.
2. J.R. Marchant, D.S. Chothia. Journal of Medicinal Chemistry,1970, 13, 335-336.
3. M.S. Singare, D.B. Ingle. J. Indian Chem. Soc., 1976, 53, 1036-1037.
4. A.V. Dobaria,J.R. Patil,J Padaliya,H.H. Parekh. Indian J. Heterocyclic chem.,2001, 11, 115-118.
5. S.M. Nair, I.R.A. Bhattacharya. Asian Journal of Chemistry. 2009, 21(1), 504-510.
6. S.Shah, R. Vyas, R.H. Mehta. J. Indian chem. Soc., 1992, 69, 590.
7. J. Parekh, P. Inamdar, R. Nair, S. Baluja, S. Chandra. Journal of the Serbian Chemical Society, 2005,70, 1155-1161.
8. V. S. V. Satyanarayana, P. Sreevani, Amaravadi Sivakumar and V. Vijayakumar . ARKIVOC 2008, 17, 221-233.
9. B. Sutariya, S. K. Raziya, S. Mohan, S.V. Sambasiva Rao. Indian J.chem., 2007, 46B, 884-887.
10. S. Bairagi, A. Bhosale, M. N. Deodhar, E-Journal of chemistry 2009. 6, 759-762.
11. A. P. Mishra, M. Soni. Metal-based drugs. 2008. II, 875410, 1-7.
12. J. K. Gupta, De. Biplab, V. S. Saravanan. Indian J.Chem., 2006, 45B, 2580-2582.
13. S. Bawa, Suresh Kumar. Indian J.Chem., 2009, 48B, 142-145.
14. M. Verma. S. N. Pandeya, K. N. Singh ,J P Stables. Acta Pharm., 2004,54,49-56.
15. N. S. Kozlov, G. P. Korotyshova, N. G. Rozhkora, E. I. Andreeva. Vesti Akad Navuk USSRserkhim. Navuk, 1986, 2, Chem. Abstr. 1987, 106, 155955.
16. S.Huneck, K. Schreiber, H. D. Grimmecke. J. plant growth Regul., 1984,3,75-84. Chem.Abstr. 1985,102,1871.
17. P. H. Wang, J. G. Keck, E. J. Lien, M. M. C. Lai, Journal of Medicinal Chemistry 1990, 33 (2), 608-614.
18. Das, A., Trousdale M. D., Ren, S., Lien, E. J. Antiviral Res. 1999, 44(3), 201.
19. Das B. P., Choudhury R. T., Das K. G., Choudhury D. N., Choudhury B. Chem. Environ. Res. 1994, 3 (1&2), 19.
20. Samadhiya S., Halve A. Orient. J .Chem. 2001, 17 (1), 119.
21. R.S. George, R. Joseph, K.E. George. Int. J. Polym Matter, 1993,23,17-26.
22. .Taggi A. E., Hafez A. M., Wack H., Young B., Ferraris D. and Lectka T., J Am Chem Soc.,2002, 124, 6635.
23. L. Shi, H.M. Ge, S.H. Tan, H.Q. Li, Y.C. Song, H. L. Zhu, R.X. Tan, European Journal of Medicinal Chemistry, 2007, 42(4), 558-564
24. P. Panneerselvam, B. A. Rather, D. R. S. Reddy,N. R. Kumar, European Journal of Medicinal Chemistry,2009, 44(5), 2328-2333
25. Z.C. Liu, B.D. Wang, Z.Y. Yang, Y. Li, D.D. Qin, T.R. Li, European Journal of Medicinal Chemistry, 2009, 44(11), 4477–4484
26. M. J. Hearn, M. H. Cynamon, M.F. Chen, R. Coppins, J. Davis,H. J.O. Kang, A. Noble, B. T.Sekine, M. S. Terrot,D. Trombino,M. Thai, E. R. Webster, R. Wilson, European Journal of Medicinal Chemistry, 2009, 44(10), 4169–4178
27. Seely HW and Van Demark PJ. Microbes in Action: A Laboratory Manual of Microbiology DB Taraporewala Sons and Co. Bombay 1975; 55.
28. Banty AL. The Antimicrobial Susceptability Test: Principle and Practice Ed. by Illus Lea and Febiger (Philadelphia, PA, USA) 1976; 180.