Synthesis, Spectral Characterization & Biological studies of Schiff bases of ethyl {2-amino-6-[(4-fluorobenzyl) amino] pyridin-3-yl}carbamate

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Abstract- A new family of Schiff bases derived from ethyl {2-amino-6-[(4-fluorobenzyl)amino]pyridin-3-yl}carbamate and Structural features were obtained from their UV-Vis., FTIR, ^{1}H NMR, ^{13}C NMR & Mass spectral studies & subjected to study their antimicrobial efficacy against gram + & gram – bacteria. All the compounds have been found to be satisfactorily activity.

Keywords – Schiff base, Structural features, Efficacy, Antimicrobial, carbamate.

I. INTRODUCTION

A Schiff base is a compound formed from the condensation of aldehyde or a keton (Holm et al., 1966; Hobday and smith, 1972; Pierre, 1987). These are the compounds containing characteristic -C=N- group. Several methods have been reported for the preparation of azomethines. Selvam *et.al* [1] have prepared sulfonamide and its derivatives as anti-HIV agents. More *et. al* [2]have marked the biological activity of Schiff bases synthesized from aminothiazoles. Ernst Bayer [3] has reported some metallocomplex Schiff bases derived from *o*-amino phenol. Schiff bases can be synthesized from an aromatic amine and a carbonyl compound by nucleophilic addition forming a hemiaminal, followed by a dehydration to generate an imine [4]. They are well known intermediates for the preparation of azetidinones, thiazolidinones, oxadiazolines and many other derivatives. Azomethines exhibit a wide range of pharmacological activities like antimicrobial [5], antiparasitic [6], anti-inflammatory [7], anticancer [8] *etc*. Flupirtin base imines and their derivatives posseses several interesting biological activity such as antimicrobial, antifungal [9-15], activities. In this work ,the synthesis and characterization of some Schiff bases for pharmacological studies are reported.

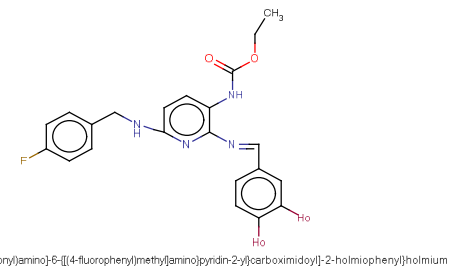
II. EXPERIMENTAL METHOD

To the requisite amount of aldehyde dissolved in approx 10 ml methanol , 0.0064 mol of amine and few drops of 0.1% KOH were added (PH: 6-7) and the mixture was refluxed for 4-5 hrs at 40- 50 ^{0}C in a water bath. The resulting solution was cooled at room temperature, and then poured over crushed ice with constant stirring. The precipitate was filtered and washed with cold methanol to remove excess of aldehyde. The product was crystallized from cold methanol and dried under vacuum (F1-F4).

$$R\text{-}CHO + R'\text{-}NH_2 \longrightarrow R\text{-}CH{=}N\text{-}R'$$

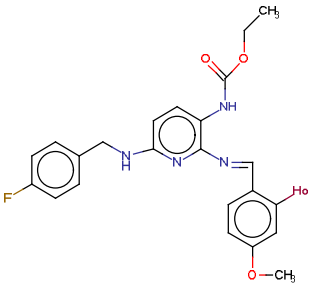
STRUCTURE OF SCHIFF BASES: (F1 – F4)

1) F1



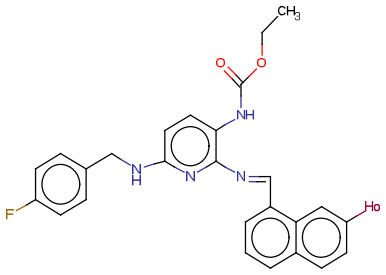
{5-[(E)-N-{3-[(ethoxycarbonyl)amino]-6-[[(4-fluorophenyl)methyl]amino}pyridin-2-yl}carboximidoyl]-2-holmiophenyl}holmium

2) F2



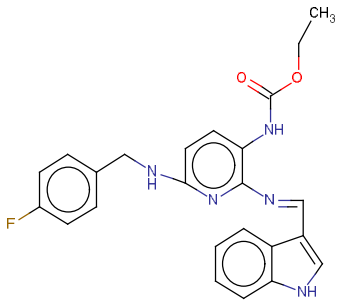
{2-[(E)-N-{3-[(ethoxycarbonyl)amino]-6-{[(4-fluorophenyl)methyl]amino}pyridin-2-yl}carboximidoyl]-5-methoxyphenyl}holmium

3) F3



{8-[(E)-N-{3-[(ethoxycarbonyl)amino]-6-{[(4-fluorophenyl)methyl]amino}pyridin-2-yl}carboximidoyl]naphthalen-2-yl}holmium

4) F4



ethyl N-(6-{[(4-fluorophenyl)methyl]amino}-2-[(E)-(1H-indol-3-ylmethylidene)amino]pyridin-3-yl)carbamate

III. RESULT AND DISCUSSION

The newly synthesized Schiff bases were characterized by Spectral data and Antimicrobial data. The absorption bands of novel Schiff bases are totally agreed with anticipated structure. The details is explains in the tables. The synthetic compounds and their respective controls produced different inhibition zones against the tested bacterial strains. The controls were deducted from the tested compounds, there was noticeably different depending on the structures.

A Schiff base is a compound formed from the condensation of aldehyde or a keton (Holm et al., 1966; Hobday and smith, 1972; Pierre, 1987). These are the compounds containing characteristic -C=N- group. Several methods have been reported for the preparation of azomethines. Selvam *et.al* [1] have prepared sulfonamide and its derivatives as anti-HIV agents. More *et. al* [2]have marked the biological activity of Schiff bases synthesized from aminothiazoles. Ernst Bayer [3] has reported some metallocomplex Schiff bases derived from *o*-amino phenol.

Schiff bases can be synthesized from an aromatic amine and a carbonyl compound by nucleophilic addition forming a hemiaminal, followed by a dehydration to generate an imine [4]. They are well known intermediates for the preparation of azetidinones, thiazolidinones, oxadiazolines and many other derivatives. Azomethines exhibit a wide range of pharmacological activities like antimicrobial [5], antiparasitic [6], anti-inflammatory [7], anticancer [8] *etc.* Flupirtin base imines and their derivatives posseses several interesting biological activity such as antimicrobial, antifungal [9-15], activities. In this work ,the synthesis and characterization of some Schiff bases for pharmacological studies are reported.

RESULT TABEL:

COMPOUND CHARACTERISTIC							
No	**M.F**	**M.W**	**Color**	**% C Found (Calcd)**	**% H Found (Calcd)**	**% N Found (Calcd)**	**R_f**
F1	$C_{22}H_{21}FN_4O_4$	424.44	Black	62.26	4.99	13.20	0.27
F2	$C_{23}H_{23}FN_4O_4$	438.47	Brown	63.00	5.29	12.78	0.79
F3	$C_{26}H_{23}FN_4O_3$	458.50	Yellow	68.11	5.06	12.22	0.64
F4	$C_{24}H_{22}FN_5O_2$	431.38	Light Yellow	66.81	5.14	16.23	0.73

CHARACTERISTICS IR ABSORPTION BANDS OF SIMILAR COMPOUNDS									
Sr.No.	**Sample Name**	**Ar C=N cm^{-1}**	**Ar C-Ncm^{-1}**	**C-O cm^{-1}**	**N-H amines cm^{-1}**	**Ar-OCH3 cm^{-1}**	**Ar-OH cm^{-1}**	**Ar C=C cm^{-1}**	**Ketone C=O cm^{-1}**
1	F1	1601	1300	1222	3340	--	3150	1510	1708
2	F2	1602	1296	1220	3310	1060	3159	1506	1707
3	F3	1624	1302	1221	3338	---	3061	1518	1697
4	F4	1601	1301	1220	3340	---	---	1508	1709

^{1}H NMR SPECTRA

Sr. No.	Compound code	Hydrogen	δ(ppm)	Multiplity	Solvent
1	F1	Ar-H	8.32	Doublet	DMSO
		Ar-H	7.48	Doublet	
		4Ar-H	7.04	Triplet	
		3Ar-H	6.64	Triplet	
		Ar-NH	3.49	Triplet	
		Ar-CH=N-Ar	8.86	Singlet	
		Ar-NH-C=O	9.72	Singlet	
		CH2	4.03	Quarterate	
		CH3	1.18	Triplet	
		2Ar-OH	5.14	Singlet	
		Ar-CH2	4.47	Doublet	

Sr. No.	Compound code	Hydrogen	δ(ppm)	Multiplity	Solvent
2	F2	Ar-H	7.39	Singlet	DMSO

		4Ar-H	7.33	Doublet	
		4Ar-H	6.48	Doublet	
		Ar-OH	14.01	Singlet	
		Ar-NH	3.47	Triplet	
		Ar-CH=N-Ar	8.86	Singlet	
		Ar-NH-C=O	9.06	Singlet	
		CH2	4.02	Quarterate	
		CH3	1.18	Triplet	
		Ar-OCH3	3.77	Singlet	
		Ar-CH2	4.53	Doublet	

Sr.No.	Compound code	Hydrogen	δ(ppm)	Multiplity	Solvent
3	F3	2Ar-H	7.81	Doublet	DMSO
		2Ar-H	7.69	Quarterate	
		2Ar-H	7.53	Quarterate	
		2Ar-H	7.35	Doublet	
		2Ar-H	7.33	Doublet	
		Ar-H	6.78	Doublet	
		Ar-H	6.49	Doublet	
		Ar-NH	3.39	Triplet	
		Ar-CH=N-Ar	9.50	Singlet	
		Ar-NH-C=O	8.95	Singlet	
		CH2	4.13	Quarterate	
		CH3	1.02	Triplet	
		Ar-OH	15.10	Singlet	
		Ar-CH2	4.59	Doublet	

Sr. No.	Compound code	Hydrogen	δ(ppm)	Multiplity	Solvent
4	F4	Ar-H	7.72	Doublet	DMSO
		2Ar-H	7.56	Quarterate	
		2Ar-H	7.40	Doublet	
		Ar-H	7.32	Doublet	
		Ar-H	7.21	Doublet	
		2Ar-H	7.16	Doublet	
		Ar-H	5.90	Doublet	
		Ar-OH	13.11	Singlet	
		Ar-NH	4.13	Triplet	
		Ar-CH=N-Ar	8.42	Singlet	

		Ar-NH-C=O	9.51	Singlet	
		CH2	4.17	Quarterate	
		CH3	1.16	Triplet	
		CH2-N-Ar	1.29	Singlet	
		Ar-CH2	4.30	Doublet	

- (F1)^{13}C NMR (solvent : DMSO) δppm: 14.51, 43.94, 60.29, 106.60, 109.78, 114.62, 120.03,,123.53, 124.55, 128.83, 137.27, 144.07, 145.24, 149.77, 151.46, 152.14, 159.55, 161.95, 191.09
- (F2)^{13}C NMR (solvent : DMSO) δppm: 14.51, 44.09, 55.43, 60.10, 101.30, 104.23, 107.10, 112.83, 114.63, 116.63, 128.47, 129.85, 134.63, 137.04, 151.41, 155.81, 159.57, 160.24, 164.12, 165.03
- (F3)^{13}C NMR (solvent : DMSO) δppm: 14.57, 44.01, 60.45, 106.59, 107.59, 112.45, 115.04, 118.60, 123.66, 125.02, 126.14, 128.71, 129.34, 133.69, 136.69, 139.05, 145.44, 147.20, 155.34, 156.07,159.73, 162.13, 178.61

ANTIMICROBIAL ACTIVITY

All the newly synthesized Schiff bases were subjected to antimicrobial activity against two bacterial strains Escherichia coli and Staphylococcus aurous at 10g/ml. The soaked discs were incubated at 35 ^{0}C for 24 hours. Diameters of the zones of inhibition (in mm) were measured by disc diffusion method. The results are reported in table.

Antimicrobial Result Table: In 100 µg

STRAIN	**CIPROFLOXACIN (mm)**	**F1 (mm)**	**F2 (mm)**	**F3 (mm)**	**F4 (mm)**
Pseudomonas aeruginosa	90	10	12	11	12
Escherichia coli	85	12	10	12	13
Staphylococcus aureus	82	14	12	10	15
Bacillus subtilis	92	12	12	10	10

IV.CONCLUSION

The result of the investigation revealed that the observed data and antimicrobial activities are different due to the presence of different functional groups of synthesized compounds. Obviously, the comparative evaluation of active compounds will required further studies; the data reported in this article may be helpful guide for medicinal chemist who are working in this area.

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