Oriental Journal of Chemistry Vol. **24**(2), 721-724 (2008)

Synthesis and antimicrobial properties of Flavone imines

N.A. GHANWATE*, A.W. RAUT[1] and A.G. DOSHI[2]

*Department of Microbiology, Dr. P.D.M. Medical College, Amravati (India)
[1]Ex. Reader Department of Chemistry, Shri Shivaji Science College, Amravati (India)
[2]Ex. Prof. and Head Department of Chemistry Vidyabharti Science College, Amravati (India)

(Received: January 05, 2008; Accepted: April 13, 2008)

ABSTRACT

Chalcone condenses with substituted aniline to give chalcone imine. This chalcone imine when refluxed in DMSO-I_2-H_2SO_4 system affords flavone imine. Substituted flavone imines were synthesized and tested for its antimicrobial activity against pathogenic bacteria and fungi. Sensitivity carried out by disc diffusion method displayed good level of antibacterial activity.

Key words : Flavone imines, Antimicrobial activity.

INTRODUCTION

Schiff bases have attracted much attention due to their biochemical and biological activities such as antiviral[1], anticancer[2,3], antimicrobial[4] and antibacterial[5]. Anticancer Schiff bases have been synthesised by condensation of aniline with substituted benzaldehyde.[6] Schiff bases like flavone imines have been reported to exhibit antimicrobial properties[7].

DMSO-I_2 with or without H_2SO_4 reagent has been used for oxidative cyclisation of 2-hydroxy chalcone to flavones and dehydrogenation to flavonoids.[8] Phenol Schiff bases with DMSO-I_2-H_2SO_4 system give -N-phenyl benzisoxazolines.[9,10,11] Synthesis of 8-Nitro-5-chloro-4-substituted-N-(substituted phenyl) flavone imine have been recently reported.[12] Substituted acetophenon and substituted chalcone are prepared by known methods[13].

Chalcone condenses with substituted aniline in ethanol in presence of 2,3 drops of conc. H_2SO_4 to give chalcone imine.

Chalcone imines react with DMSO-I_2-H_2SO_4 system to give flavone imine.

The synthesized flavone imines were screened for their antimicrobial activity against bacteria like *Escherichia coli, Klebisella pneumoniae, Salmonella typhi, Salmonella typhimurium, Shigella flexneri, Proteus spp, Protues merabilis, Proteus vulgaris, Pseudomonas aeruginosa, Aerobacter aerogenes, Staphylococcus aureus and Bacillus spp*[14,15] and fungal isolates like *Cryptococcus neoformans, Candida albicans, Trichophyton mentagrophytes, Microsporum gypseum, Mucor, Rhizopus, Aspergillus niger, Aspergillus flavus and Aspergillus fumigatus*[16] by disc diffusion method[17] by dissolving the compounds in methanol[18].

EXPERIMENTAL

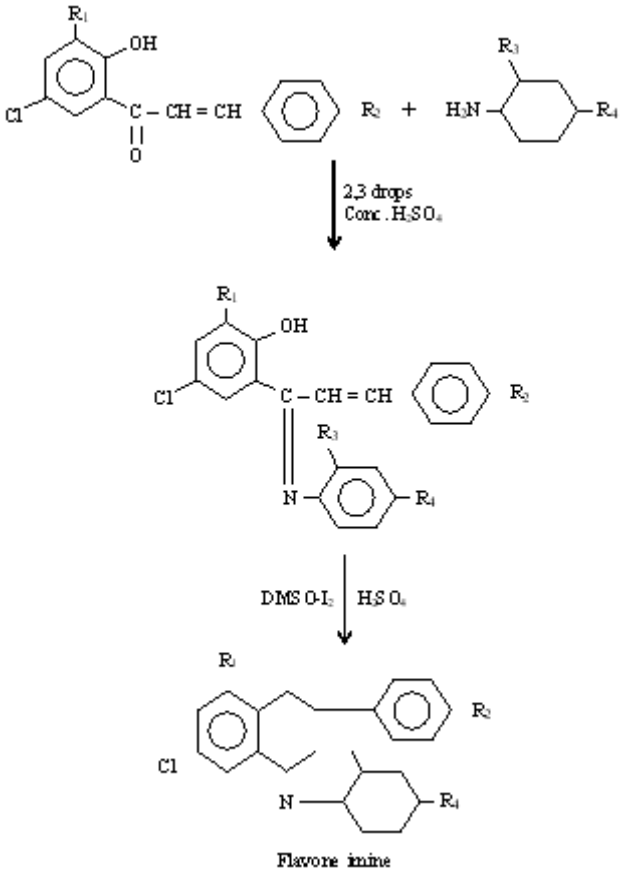
Preparation of flavone imine

Substituted chalcone are prepared by know method. Substituted chalcone condenses with substituted aniline in presence of 2,3 drops of conc. H_2SO_4 gives chalcone imine.

Substituted chalcone imines was dissolved in DMSO (40ml) and conc. H_2SO_4, 2, 3 drops was added. The mixture was refluxed for 10 min. It was then cooled and little catalytic amount of iodine was added. The reaction mixture was again heated for 1 hour in water bath then cooled and diluted with cold water. The resulting solid mass was treated

Table 1: Physical data of Synthesized flavone imines

Compound No.	R_1	R_2	R_3	R_4	m.p. (°C)	Yield (%)
IIa	Br	H	H	H	147	80
IIb	Br	H	H	$-CH_3$	285	82
IIc	Br	$-OCH_3$	H	$-CH_3$	312	80
IId	Br	$-OCH_3$	NO_2	H	127	80
IIe	H	$-OCH_3$	H	-CH	330	81
IIf	H	$-OCH_3$	NO_2	H	130	82



Scheme 1

Table 2: Bacteria showing sensitivity to flavone imine (Sensitivity measured in mm)

Compd.	*Escherichia* coli	*Klebisellan* pneumoniae	*Salmonella* typhi	*Salmonella* typhimurium	*Shigella* flexneri	*Proteus* spp.	*Proteus* merabilis	*Proteus* vulgaris	*Pseudo-monas* aeruginosa	*Aerobacter* aerogenes	*Staphyl-ococus* aureus	*Bacillus* spp.
IIa	-	-	-	-	-	-	-	7	-	7	7	7
IIb	10	13	8	8	15	8	8	10	-	8	10	10
IIc	-	10	8	8	11	-	8	8	8	7	13	9
IId	8	9	8	7	8	9	11	8	9	10	13	10
IIe	10	-	12	8	-	9	7	8	-	10	15	10
IIf	10	-	9	7	8	-	-	-	-	9	13	9

Table 3 :Fungi showing sensitivity to flavone imine (Sensitivity measured in mm)

Compd.	*Cryptococcus* neoformans	*Candida* albicans	*Trichophyton* mentagrophytes	*Microsporum* gypseum	*Mucor*	*RhiZopus*	*Aspergillus* niger	*Aspergillus* flavus	*Aspergillus* fumigatus
IIa	-	-	-	-	-	-	-	-	-
IIb	10	8	12	12	11	13	8	12	12
IIc	15	13	10	11	11	12	8	-	-
IId	20	13	22	20	15	18	11	25	20
IIe	12	9	15	13	10	10	-	15	25
IIf	23	15	20	18	19	15	20	25	25

with water 10% Sodium thiosulphate solution to remove iodine and again by water and crystallized from alcohol acetic acid mixture to get flavone imine. All the flavone imines stated in table 1 were tested in vitro for their antimicrobial activity by disc diffusion method by dissolving the compounds in methanol at a concentration of 3000 µg/ml. The concentration of compounds per disc was 30 µg.

RESULTS AND DISCUSSION

Most of the flavone imines showed significant antibacterial and antifungal activities as stated in table 2 and 3 respectively.

The antibacterial activity is highest against *S. aureus, Bacillus spp., A. aerogenes, S. typhi* and *Shigella flexneri* and least against pseudomonas. Compound IIa and IIb showed highest antibacterial activity. Compounds IIf and IId showed highest antifungal activity.

In the present study it has been interesting to note that the flavone imines were more active against fungi as compared to bacteria.

REFERENCES

1. Das A. Trousdale M.D., Ren S. and Lien E.J., *Antiviral Res*, **44**: 201 (1999).
2. Sengupta, J., *Indian J. App. Chem.*, **2**: 29 (1964).
3. Modi J.D., Sabnis S.S. and Deliwala E.V., *J. Mol. Chem.*, **13**: 935 (1970).
4. Piscopo E., Diurno M.V., Gogliordi R., *Bull. Soc. Ital Biol. Sper.*, **63**: 827 (1987).
5. Dhunwad S.O., Gudasik B. and Goudar T.R., *Indian J. Chem.*, **34**A: 38 (1995).
6. Popp F.D., *J. Org. Chem.*, **26**: 1566 (1966).
7. Raut A.W., Doshi A.G. and Raghuwanshi P.D., *Oriented J. Chem.*, **14**(2): 337-338 (1998).
8. Doshi A.G., Soni P.A. and Ghiya B.J., *Indian J. Chem.*, **25**B: 759 (1986).
9. Lokhande P.D. and Ghiya B.J., *J. Indian Chem. Soc.*, **68**: 412 (1990).
10. Kadu V.B. and Doshi A.G., *Orient. J. Chem.*, **13**(3): 277-280 (1997).
11. Raut A.W., Doshi A.G. and Raghuwanshi P.B., *Orient. J. Chem.*, **14**(2): 363-364 (1998).
12. Sau. Sangeeta R. Rathi, Ph.D. Thesis, S. G. B. V. Amravati (2005).
13. Doshi A.G. and Ghiya B.J., *Current Science*, **55**(10): 502-503, (1986).
14. Man Mohan Banerjee, *Essentials of Medical Microbiology*, 1-2 (1999)
15. Ananthanarayan R. and Hayram Panikar C.E. (text Book of Microbiology), Orient Longman Vth Edi. (2002).
16. Konemann Elmer W., Glenn D. Roberts, Practical Laboratory Mycology, IIId Ed. (2001).
17. Crukshank Robert, Duguid J.P., Marimicon B.P., Swain R.H.A., Medical Microbiology, 12th Ed., Vol. 11, Churchill living Store, Edinburgh, London, New York (1995)
18. Donald C.G., William A.R., In assay methods of Antibiotic in lab manual medical encyclopedia Inc. (1955).