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Synthesis of Schiff bases of N-N-dimethylamino benzaldehyde and its antimicrobial activity

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ABSTRACT

N-N-dimethyl amino benzaldehyde condensed with aniline and substituted aniline in ethanol in presence of 3-4 drops of concentrated H_2SO_4, gives azomethine group. The structure of azomethine confimed by spectral and chemical data. These azomethine are tested against test organism *Staphylococcus aureus, Bacillus, megatherium, Bacillus subtilis, Proteus vulgaris, Escheriche coli, Pseudomonas aeruginosa* and MIC values are obtained by serial dilution method. Title compounds were found effective against both Gram positive and Gram negative bacteria. The minimum concentrations (MICs) were in the range of >3 to 200 mg/ml for Gram positive bacterial and 3.0 - 200 mg/mL for Gram negative bacteria.

Key words: Azomethine and antimicrobial activity, Schiff bases

INTRODUCTION

Azomethine (Schiff base) exhibit anticancer and antitubercular activities[1]. Anticancer Schiff bases have been synthesised by condensation of aniline with substituted bensaldehyde[2]. Benzisoxazoles[3] are reported to form by heating O-bromo-acetophenone oxime and acetophenone oxime acetate. Benzisoxazole4 are known for their biological activity.

2-hydroxydibenzoyl methane with hydroxyamine hydrochloride in DMF water gives 1,2-benzisoxazole5. We have reported the formation of phenolic Schiff bases[6,7,8].

We reported formation of Schiff bases of thiophene 2-Carboxaldehyde[9]. Schiff bases as polydented ligands and potential anti bacterial reagents[10]. Antimicrobial agents[11], antiinflamatory and antimicrobial agents[12].

In present communication we are reporting the formation of Schiff bases of N,N-dimethyl amino benzaldehyde.

The antimicrobial activity of these Schiff bases were calculated by Serial Dilution method13 by calculating minimum inhibitary concentration. The Schiff base are tested against the organisms *Staphylococcus aureus, Bacillus subtilis, Proteus vulgaris, Escherichia coli*.

EXPERIMENTAL

Preparation of N-(4-chlorophenyl)-4-(N,N-dimethyl amino) phenyl azomethine (T1)

A mixture of 4-N,N-dimethyl amino benzaldehyde (1.49 gm) and p-chloro aniline (1.27 gm) was dissolved in 30 ml absolute ethanol and 2-3 drops of concentrated sulphuric acid (H_2SO_4) were added. The mixture was refluxed for 45 minutes. It was then cooled, diluted with ice cold water and

resulting solid was crystallized from 40 % ethanol to yield N-(4-chlorophenyl)-4-(N-N-dimethyl amino) phenyl azomethane (T1) m.pt. 115 0C, yield 78 %.

Properties of Compound (T1)

1. It is faint orange coloured crystalline solid, m.p. 115 0C.
2. From analytical data, molecular formula was found to be $C_{15}H_{15}N_2Cl$. The molecular weight being 258.

Table 1: Synthesis, m.pt. and yield of Azomethine

Compound Nos	Name of Compounds	m.pt.	% Yield	Colour
T_1	N-(4-Chlorophenyl)-4-(N,N-dimethyl amino) phenyl azomethine	115°C	78	Faint Orange
T_2	N-(4-Methoxyphenyl)-4-(N,N-dimethyl amino) phenyl azomethine	148°C	74	Biscuit
T_3	N-(4-Nitrophenyl)-4-(N,N-dimethyl amino) phenyl azomethine	173°C	79	Dark Brown
T_4	N-(4-Methylphenyl)-4-(N,N-dimethyl amino) phenyl azomethine	130°C	81	Golden Yellow
T_5	N-(3-Methylphenyl)-4-(N,N-dimethyl amino) phenyl azomethine	142°C	76	Signal Red
T_6	N-(2-Methylphenyl)-4-(N,N-dimethyl amino) phenyl azomethine	146°C	74	Mikado
T_7	N-(Napthyl)-4-(N,N-dimethyl amino) phenyl azomethine	98°C	75	Mustard
T_8	N-(3-Nitrophenyl)-4-(N,N-dimethyl amino) phenyl azomethine	101°C	69	Copper leaf
T_9	N-Phenyl-4-(N,N-dimethyl amino) phenyl azomethine	65°C	79	Brown Stone
T_{10}	N-(2-Carboxyphenyl)-4-(N,N-dimethyl amino) phenyl	142°C	68	Dark Red azomethine

Table 2: Antimicrobial Activity of Azomethine (MIC mg/mL)

	Gram +ve Bacteria		Gram -ve Bacteria	
Compound Nos	***Staphylococcus aureus***	***Bacillus subtilis***	***Proteus vulgaris***	***Escherichia coli***
T_1	200	100	100	200
T_2	50	62	50	62
T_3	50	125	50	100
T_4	50	100	100	100
T_5	100	250	250	250
T_6	100	500	250	500
T_7	25	25	25	50
T_8	62	50	80	50
T_9	200	200	125	200
T_{10}	12.5	12.5	12.5	12.5
Ts	12.5	12.5	12.5	06

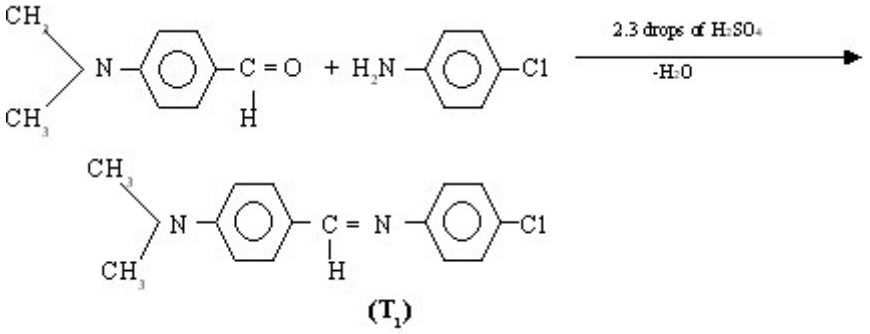
Ts : Standard Drug Chloromphenicol

3. UV-VIS-uv-vis spectrum was recorded in methanol lmax values are 329 nm and 269 nm. These values corresponding to n-p* and p-p* transition in azomethine. The large value of lmax indicated the extended conjugation.
4. I.R. - The I.R. spectrum was recorded in Nujol.
   1] (CH str of CH_3) 2851.4 cm^{-1}
   Aromatic (C-H) str 3030 cm^{-1}
   (C=C str) 1577 cm^{-1}
   Azomethine (C=N str) 1601.8 cm^{-1}
   (C-N str) 1163.5 cm^{-1}
   (C-Cl str) 732 cm^{-1}
5. P.M.R. - The P.M.R. spectrum was recorded in $CDCl_3$
   3.02d (s, 6H, Ar(CH_3)2,
   6.71 to 7.75 d (m, 8 H, Ar-H)
   8.26d (s, 1H of -CH=N azomethine).

From these spectral and chemical data the compound is N-(4-chlorophenyl)-4-(N,N-dimethyl amino) phenyl azomethine (T1).

These azomethine were tested against test organisms. Minimum inhibitary concentrations mg/ml calculated by serial dilution method. Their activities are compared with standard drug chloramphenicol. These MIC values are listed in table 2.

The title compound were graded as highly active (MIC, values 3, upto 12.5 mg/mL), moderately active (MIC value 25 and 50 mg/mL) poorly active (MIC value 100 and 200 mg/mL). Thus T10 and T9 are highly active. Remaining are active or poorly active in comparision to chloramphenicol.



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