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### Synthesis and antibacterial activity of new schiff's bases

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#### Abstract

Five novel schiff bases have been prepared from 2-Amino-4-(4-acetanilido) thiazole and substituted aromatic aldehyde to form a number of potentially biologically active Schiff bases (SA<sub>1</sub>-SA<sub>5</sub>). The structure of all these compounds have been established on the bases of analytical and spectral data compounds SA<sub>1</sub>-SA<sub>5</sub> are comparable with standard drug ampicillin against s. aureus and E.coli. Compounds SA<sub>2</sub>, and SA<sub>5</sub> shows good activity as compared to standard drug.

Keywords: Schiff bases, Antibacterial activity, Aminothiazole, Ampicillin.

#### Introduction

Schiff bases are used as substrates in the preparation of a number of industrial and biological active compounds via ring closure, cycloaddition, and replacement reactions. More ever Schiff bases are also known to have biological activities such as bacteriostatics, antimicrobial<sup>1-2</sup>, antifungal<sup>3</sup> antitumor<sup>4</sup>, and CNS regulants of high selling diuretics<sup>5-7</sup>. All these facts were driving forces to developed novel Schiff bases with wide structural variation. Thus Schiff bases plays pivotal role in medicinal chemistry.

In the present study, various Schiff bases were synthesized and screened for their antibacterial<sup>8-10</sup> activity. Starting compound p-acetamidoacetophenone was obtained by treating p-aminoacetophenone with acetic anhydride, the required Schiff bases was obtained according to the reported method<sup>11-12</sup> aminothiazole was treated with various aromatic aldehydes in alcohol to get to different substituted schiff's bases (SA<sub>1</sub> - SA<sub>5</sub>).

#### Material and methods

Melting points were determined in precision melting point apparatus and in open capillaries and are uncorrected. Physical characterization data of all the compounds are given in table 1. The IR spectra were run on a "SHIMADZU FT-IR 8400S FTIR spectrometer in KBr pellets. <sup>1</sup>H NMR was recorded using BRUCKER 400 MHz NMR spectrometer in DMSO-d<sub>6</sub> Using TMS as internal standard. Mass spectra were recorded on SHIMADZU GC-MS QP-5050 mass spectrometer. All the chemicals used were of analytical grade.

#### Synthesis of P-Acetamidoacetophenone (II)

P-Aminoacetophenone (30 gm, 0.22 M ) and acetic anhydride (90 ml) was taken in beaker. The reaction mixture was heated on a steam-bath for 45 min and allowed to stand for 2 hrs. The solid obtain was filtered, dried and purified by recrystallization from ethanol to get pure 25 gm (83.33%) of the compound II obtained as white crystals.

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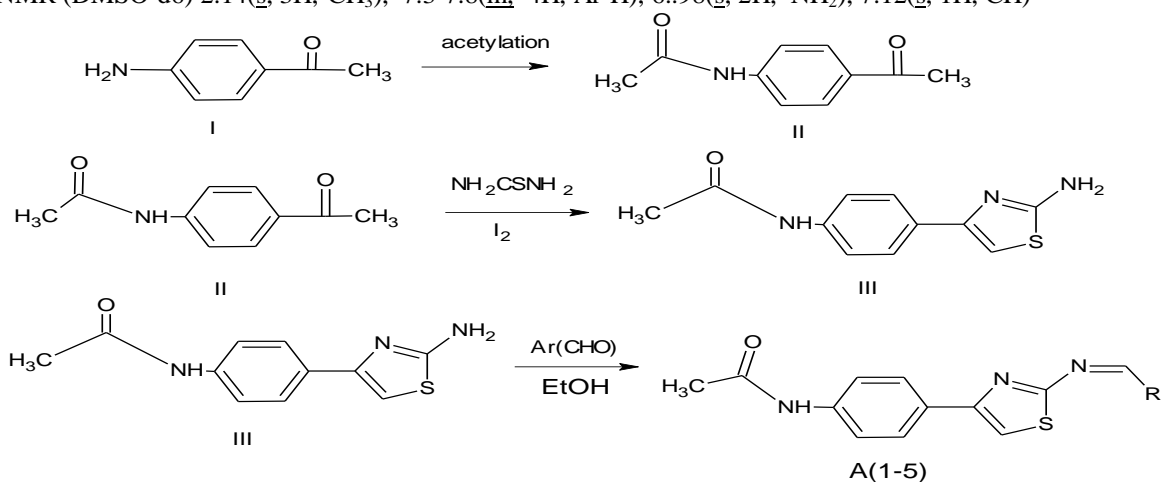
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**Synthesis of 2-Amino-4-(4-acetanilido) thiazole (III)**

Thiourea (30.4g, 0.4 mole) and iodine (50.8 g, 0.2 moles) were triturated and mixed with p-acetamidoacetophenone (24g, 0.2 moles). The reaction mixture was heated on a water bath with occasional stirring for 8 hours. The solid obtained was triturated with diethyl ether to remove any unreacted p-acetamidoacetophenone, after which it was washed with sodium thiosulphate to remove any unreacted iodine finally, it was washed with water and the residue filtered dried and dissolved in hot water, heated until most of the solid had gone in to the solution and filtered when hot. The filtrate was cooled and made alkaline with a strong solution of ammonia, filtered and purified by recrystallisation from water to get pure 15.3 gm (62.5%) of the compound III obtained as light brown crystals.

IR(KBr): 3306(N-H), 1670(C=O), 2965(Ar-CH), 3403(NH<sub>2</sub>)

<sup>1</sup>H NMR (DMSO-d<sub>6</sub>) 2.14(s, 3H, -CH<sub>3</sub>), 7.3-7.8(m, 4H, Ar-H), 6.98(s, 2H, NH<sub>2</sub>), 7.12(s, 1H, CH)



**SA<sub>1</sub>**, Ar = phenyl, **SA<sub>2</sub>**, Ar = 4-nitrophenyl, **SA<sub>3</sub>**, Ar = 2-methylphenyl, **SA<sub>4</sub>**, Ar = 3-methylphenyl, **SA<sub>5</sub>**, Ar = 2-bromophenyl

**Synthesis of Schiff's bases (SA<sub>1</sub> - SA<sub>5</sub>).**

A mixture containing 2-Amino-4-(4-acetanilido) thiazole (0.01mole) and substituted aromatic aldehyde (0.01mole) in 40 ml of ethanol along with glacial-acetic acid (2-3 drops) was reflux for 3 hrs. The reaction is monitored by TLC. The reaction mixture was cooled to room temperature. Solid obtained was filtered washed with Ethanol, dried and purified by recrystallisation in DMF: Water (1:1) mixture. To get pure compound Schiff Bases (**SA<sub>1</sub>-SA<sub>5</sub>**)

**SA<sub>1</sub>** IR (KBr): 3300(N-H), 1670(C=O), 2965(Ar-CH), 1590(N=CH)

<sup>1</sup>H NMR (DMSO-d<sub>6</sub>) 2.04(s, 3H, CH<sub>3</sub>), 7.5-7.9(m, 8H, Ar-H), 8.35(s, 1H, N=CH), 8.14(s, 1H, CH), 10.02(s, 1H, NH); MS: m/z 321(M<sup>+</sup>), 251.

**SA<sub>2</sub>** IR (KBr): 3340(N-H), 1630(C=O), 1533(NO<sub>2</sub>), 1599(N=CH)

<sup>1</sup>H NMR (DMSO-d<sub>6</sub>) 2.32(s, 3H, CH<sub>3</sub>), 7.5-7.9(m, 8H, Ar-H), 8.35(s, 1H, N=CH)

MS : m/z 365(M<sup>+</sup>), 280, 217.

**SA<sub>5</sub>** IR (KBr): 3309(N-H), 1680(C=O), 675(BR<sub>2</sub>), 1598(N=CH)

<sup>1</sup>H NMR (DMSO-d<sub>6</sub>) 2.10(s, 3H, CH<sub>3</sub>), 6.9-7.5(m, 8H, Ar-H), 8.35(s, 1H, N=CH)

MS: m/z 399(M<sup>+</sup>), 312, 280

**Antibacterial screening**

All the synthesized compounds were tested for their antibacterial activity against Gram +ve (s.aureus) and the Gram -ve (E. coli) bacteria at a concentration of 500 µg/ml. using disc-diffusion method<sup>13</sup>. Ampicillin was used as a reference standard at a concentration of 500 µg/ml.

Compounds **SA<sub>2</sub>** and **SA<sub>5</sub>** showed good activity as compared to standard drug.

## Results and discussion

The structures of all the compounds have been established on the basis of spectral data analysis. The appearance of primary amino group band at  $3405\text{ cm}^{-1}$  in the IR spectrum, the NMR signal for thiazole proton at  $\delta$  7.55, the molecular ion peak at  $m/z$  231 and the fragmentation pattern peaks at  $m/z$  189, 159 and 79 confirmed the formation of compound III the compounds  $\text{SA}_1$ - $\text{SA}_5$  showed  $-\text{N}=\text{CH}$ -band in IR between  $1530$ - $1600\text{ cm}^{-1}$

The NMR spectra of the compounds  $\text{SA}_1$ - $\text{SA}_5$  exhibited absence of amino group signal of thiazole at  $\delta$  9.46 and the appearance of sharp signal of  $-\text{N}=\text{CH}-$  between  $\delta$  8.3 -9.1 which indicated the formation of Schiff bases. And the compound  $\text{SA}_1$ ,  $\text{SA}_2$ ,  $\text{SA}_5$ , showed the molecular ion peak at  $m/z$  321, 365, 399 respectively.

**Table 1: Characterization data of newly synthesized Schiff Bases SA (1-5)**

Compound No	Molecular formula	R	Molecular Weight	M.P.( $^{\circ}\text{C}$ )	Percentage yield %
$\text{SA}_1$	$\text{C}_{18}\text{H}_{15}\text{N}_3\text{OS}$	phenyl	320	192-194 $^{\circ}\text{C}$	73.48
$\text{SA}_2$	$\text{C}_{18}\text{H}_{14}\text{N}_4\text{OS}$	4-nitrophenyl	366	187-189 $^{\circ}\text{C}$	61.48
$\text{SA}_3$	$\text{C}_{19}\text{H}_{17}\text{N}_3\text{OS}$	2-methylphenyl	335	207-208 $^{\circ}\text{C}$	63.53
$\text{SA}_4$	$\text{C}_{19}\text{H}_{17}\text{N}_3\text{OS}$	3-methylphenyl	335	179-180 $^{\circ}\text{C}$	69.34
$\text{SA}_5$	$\text{C}_{18}\text{H}_{14}\text{N}_2\text{O}_1\text{SBr}$	2-bromophenyl	400	212-214 $^{\circ}\text{C}$	75.48

**Table 2: Anti-bacterial activity of newly synthesized aminothiazole derivatives**

Sr. no.	Compound	Zone of inhibition (in mm)	
		E.coli	S.aureus
1	$\text{SA}_1$	5.4	8
	$\text{SA}_2$	7.9	13
	$\text{SA}_3$	5.9	8
	$\text{SA}_4$	6.1	7
	$\text{SA}_5$	7.2	12
2	S	10.8	18
3	B	0	0

S-Standard (Ampicillin), B-Blank (DMSO)

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