



# Synthesis, Characterisation and Antibacterial Activities of Some New Bromo/Nitro 1,3-Thiazines

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## Abstract

*1,3-thiazines were prepared by refluxing the mixture of 2-hydroxy-3-bromo/nitro -5-chlorochoalcone and diphenylthiourea in alcohol and aq.KOH medium. The newly synthesized 1,3-thiazines were characterized on the basis of elemental analysis and spectroscopic data of IR,NMR. The melting points were taken in an open capillary tube. All compounds have been evaluated for their in vitro growth of inhibitory activity against Escherichia coli, Staphylococcus aureus, Bacillus subtilis and Phaseolusargenosa.*

Keywords: 1, 3-Thiazines, Antibacterial Activity, pathogenic bacteria.

## Introduction

Thiazine is a six membered heterocyclic compound which contains two hetero atoms (N and S) placed at 1,3 positions. 1,3-thiazines have a very broad spectrum of fungicides, insecticides, growth promoting hormonal effect etc. Thiazines are very useful units in the fields of medicinal and pharmaceutical chemistry and have been reported to exhibit a variety of biological activities<sup>1-2</sup>. The reaction of thiourea with  $\alpha,\beta$ -unsaturated ketones results in 1, 3 thiazines<sup>3-4</sup>. Some chloro-substituted-1, 3-thiazines have been reported for antimicrobial activity<sup>5</sup>

Thiazine reported to exhibit antitubercular, antibacterial used as cannabinoid receptor against<sup>6</sup> 1,3-thiazine derivatives and their evaluation as potential antimycobacterial agents<sup>7</sup>. The synthesis of 2,4-dihydro-1H-benzo[d] [1,3] thiazines via silver catalyzed addition-cyclization reactions are reported<sup>8</sup>. Synthesize of new chromene base heterocyclic like thiazine from 2-Amino-5-hydroxy-4-phenyl-7-methyl-4H[1-chromeno-3-carbonitrile which may show a good biological activity<sup>9</sup>. Some 1,3-thiazines are reported for its antimicrobial activity.<sup>10</sup>

## Experimental

The synthesis of 1,3-thiazines from 3-bromo-5-chlorochoalcone and 3-nitro-5-chlorochoalcone on treatment with diphenylthiourea in presence of alcoholic KOH. The melting points of these compounds were recorded on 'Tempo' melting point apparatus and are uncorrected. The carbon, nitrogen, sulphur and hydrogen analysis was carried out on 'Carlo Ebra 1106' analyzer. The IR spectra were recorded on 'Perkin-Elmer Infra Red spectrophotometer. The PMR spectra were recorded on DRX 300 spectrometer in CDCl<sub>3</sub>. Purity of the compound was tested by TLC. The study were treated for their antibacterial

impact against some common pathogenic bacteria viz. *E. Coli*, *S. aureus*, *B. Subtilis*, *P. argenosa*. The solutions of 0.01 mol dilution of test compounds were prepared in dioxane solvent separately. The discs were soaked, assuming that each disc will contain approximately 0.01 ml of test solution. The culture media was prepared by using following composition for one liter distilled water-

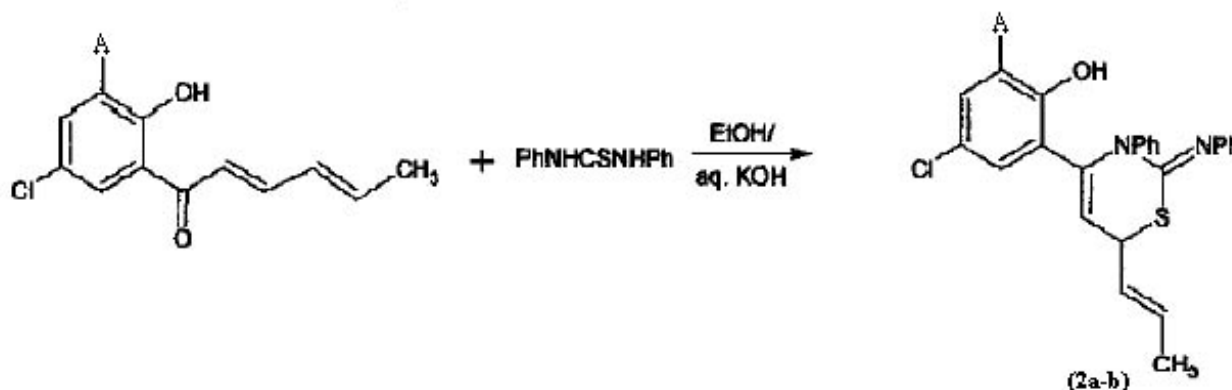
Peptone	:	5.0 g./litre
Sodium chloride	:	5.0 g./litre
Beef extract	:	1.5 g./litre
Yeast extract	:	1.5 g./litre
Agar	:	15.0 g./litre
pH (approximately)	:	7.4 ± 0.2.

The culture medium thus prepared was sterilized in autoclave at 15 lbs/inch pressure and 121°C temperature for 15 minutes. After sterilization, it was cooled down to about 50°C and poured into presterilized petriplates of 8.5 cm in diameter each and allowed to solidify the nutrient agar medium of about 14 mm depth. The petriplates were kept with nutrient broth at 37°C for 24 hr. in an incubator.

**(a) Preparation of 4-(2-hydroxy-3-bromo/nitro-5-chlorophenyl)-6-(1'-propene)-2-iminophenyl-3,6-dihydro-1, 3-thiazine (IIa/b)**

2-Hydroxy-3-bromo/nitro-5-chloro-chalcone and diphenylthiourea were dissolved in ethanol. To this aqueous KOH solution was added and this reaction mixture was refluxed for three hours, after cooling, diluted with water and acidified with 1:1 HCl. The product thus obtained was

4-(2-hydroxy-3-bromo/nitro-5-chlorophenyl)-6-(1'-propene)-2-iminophenyl-3,6-dihydro-1,3-thiazine.



A=Br/NO<sub>2</sub> Scheme-1

Compound	Molecular Formula	M.P.	Yield	Rf
1a	C <sub>12</sub> H <sub>10</sub> BrO <sub>2</sub> Cl	85 <sup>0</sup> C	78%	0.76
1b	C <sub>12</sub> H <sub>10</sub> NO <sub>4</sub> Cl	110 <sup>0</sup> C	70%	0.61
2a	C <sub>13</sub> H <sub>10</sub> N <sub>2</sub> (Ph) <sub>2</sub> BrOCl	138 <sup>0</sup> C	70%	0.67
2b	C <sub>13</sub> H <sub>10</sub> N <sub>3</sub> (PH) <sub>2</sub> SO <sub>3</sub> Cl	127 <sup>0</sup> C	70%	0.28



### Spectral interpretation of (Iib)

(a) The important frequencies observed in the IR spectrum recorded in KBr are correlated as follows-IR ( $\nu_{\max}$ )  $\text{cm}^{-1}$ : 3423  $\nu$  (-OH Stretching); 2320  $\nu$  (-C=N Stretching); 1444  $\nu$  (Ar-NO<sub>2</sub>); 1230  $\nu$  (C=O Stretching); 1313  $\nu$  (C-N Stretching)

(b) The PMR spectrum of the compound (Iib) was recorded in CDCl<sub>3</sub> with TMS as an internal standard. The observed chemical shifts and their correlations are as follows-

**NMR :** 2.5 (d, 3H, C=CH-CH<sub>3</sub>); 4.17 (d, 1H, C=C-C-H); 5.5 (d, 1H, -CH=CH); 6.5 (d, 1H, =C-H); 6.9-7.8 (m, 12H, Ar-H); 11.99 (s, 1H, Ar-OH);

### Results And Discussion

The 1,3-thiazines when screened in vitro against some common bacteria viz. *E. coli*, *S. aureus*, *B. subtilis*, *P. argenosa* it was noticed that most of all these compounds have shown remarkable inhibitory activity. An assay of newly synthesized 1,3-thiazines reveals that, almost all the compounds were strongly active against all the test pathogens *E. coli*, *S. aureus*, *B. subtilis*, *P. argenosa*. Their inhibitory impact on the bacterial growth is remarkable.

Table-2: Antibacterial activities of test compounds

S.No.	Test Compound	Zone of inhibition (mm)			
		<i>E. coli</i>	<i>S. aureus</i>	<i>B. subtilis</i>	<i>P. argenosa</i>
1	Iia	27	25	25	26
2	Iib	25	24	25	25

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