Synthesis And Antifungal Activity Of Thiazole-Triazine

Hitesh Samata[1], Sheetal Gulati[2], H. Patel[3]
[1,2]Dept. of Chemistry, Rabindranath Tagore University, Bhopal (M.P.), India
[3]Ex-Head and Prof., Dept. of Chemistry, S.P. University, VV Nagar (Gujarat) India

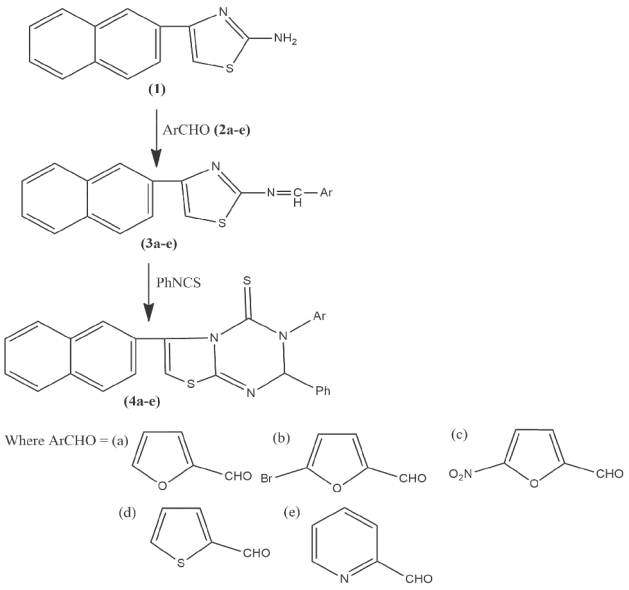
ABSTRACT
N-(arylmethylene)-4-(naphthalen-2-yl)thiazol-2-amine (3a-e) were synthesised from 4-(naphthalen-2-yl)thiazol-2-amine (1) on reaction with different hetero aryl aldehydes (2a-e). The compounds (3a-e) then react with phenyl isocyanate and formed 3-aryl-6-(naphthalen-2-yl)-2-phenyl-2H-thiazolo[3,2-a][1,3,5]triazine-4(3H)-thione (4a-e).The structures of all the synthesised compounds were characterized by elemental and spectroscopies method. All the schiff bases (3a-e) and thiazole-triazinederivatives (4a-e) examined for their antifungal activity,which show that all the compounds have good antifungal activity.

Keywords: schiff bases,thiazole-triazine,spectral studies and antifungal activity.

I INTRODUCTION

Now a days number of researchers synthesized biological active compounds. As unique heterocyclic amine, 2-amino thiazole is an initial compound for the synthesis of drugs, dyes and corrosion inhibitors. More particularly these derivatives have received more attention of bioactive compounds like antimicrobial, anesthetic, antiviral, anti T.B. etc [1-6].Thiazole derivatives were also reported with their anticancer, antiparasitic, antibacterial, antifungal agents and antifolate activity[7-11]

Thiazole and triazine moeity presented compounds shows excellent pharmaceutical activity[12,13]. Thus it was thought to explore this type of merge molecules. The present research article discussed the synthetic approach on thiazole-triazinederivatives shown in scheme-1.



II EXPERIMENTAL DETAILS

4-(naphthalen-2-yl)thiazol-2-amine (1)was synthesis by reported method[14].All other reagents were used laboratory grade.

^{1}HNMR spectra were recorded on on a Bruker (400 MHz) spectrometer. Deutorated DMSO was used as a solvent. The IR spectra of all compounds were taken in KBr pellets on a Nicolet 400D spectrometer. LC-MS of selected samples taken on LC-MSD-Trap-SL_01046. The characterization data of all these compounds are given in Table.1.

The antifungal activity of both the series of compounds (3a-e) and (4a-e) were measured at 1000ppm concentration in vitro Plant pathogen shown in Table-3 have been selected for study[15].

(a) Synthesis of N-(arylmethylene)-4-(naphthalen-2-yl)thiazol-2-amine (3a-e)

A mixture of 4-(naphthalen-2-yl)thiazol-2-amine (1) (0.01 mol) and different hetero aryl aldehydes (2a-e) (0.01mol) in anhydrous ethyl alcohol (25mL) was refluxed on a water bath for 2 to 2.5 hrs.The solid separated was collected by filtration, dried and

recrystallized from ethyl alcohol. The analysis of these compounds are represented in Table -1.

Table-1
Analysis of the Synthesized Compounds (3a-e)

Comp.	Molecular Formula M.P.*°C	Elemental Analysis			
		C%	H%	N%	S%
		Found Calcd.	Found Calcd.	Found Calcd.	Found Calcd.
3a	$C_{18}H_{12}N_2OS$ (304) 156-157	71.03 71.0	3.97 3.9	9.20 9.1	10.54 10.5
3b	$C_{18}H_{11}N_2OSBr$ (383) 162-163	56.41 56.4	2.89 2.8	7.31 7.3	8.37 8.3
3c	$C_{18}H_{11}N_3O_3S$ (349) 168-169	61.88 61.8	3.17 3.1	12.03 12.0	9.18 9.1
3d	$C_{18}H_{12}N_2S_2$ (320) 159-160	67.47 67.4	3.77 3.7	8.74 8.7	20.01 20.0
3e	$C_{19}H_{13}N_3S$ (315) 166-167	72.36 72.3	4.15 4.1	13.32 13.3	10.17 10.1

*Uncorrected LC-MS data for 3b:385, 3e: 318

(b) Synthesis of 3-aryl-6-(naphthalen-2-yl)-2-phenyl-2H-thiazolo[3,2-a][1,3,5]triazine-4(3H)-thione (4a-e)

A mixture of compound N-(arylmethylene)-4-(naphthalen-2-yl)thiazol-2-amine (3a-e) (0.01 mol), dry benzene (15 ml), and phenyl isocyanate(0.01 mol) was refluxed in 50 mL of 4N aqueous sodium hydroxide solution for 10-11 hrs. The mixture was cooled to room temperature and then neutralized with 4N hydrochloric acid. The precipitate was filtered off and then crystallized from aqueous ethanol.Theanalysisofthesecompoundsarerepresentedin Table -2.

Table-2
Analysisofthe SynthesizedCompounds(4a-e)

Comp.	Molecular Formula M.P.*°C	Elemental Analysis			
		C%	H%	N%	S%
		Found Calcd.	Found Calcd.	Found Calcd.	Found Calcd.
4a	$C_{25}H_{17}N_3OS_2$ (439) 212-213	57.92 57.9	3.11 3.1	8.10 8.0	12.37 12.3
4b	$C_{25}H_{16}N_3OS_2Br$ (516) 227-228	56.41 56.4	2.89 2.8	7.31 7.3	8.37 8.3
4c	$C_{25}H_{16}N_4O_3S_2$ (484) 220-221	61.97 61.9	3.33 3.3	11.56 11.5	13.23 13.2
4d	$C_{25}H_{17}N_3S_3$ (455) 209-210	65.90 65.8	3.76 3.7	9.22 9.2	21.11 21.1
4e	$C_{26}H_{18}N_4S_2$ (450) 245-246	69.31 69.3	4.03 4.0	12.43 12.4	14.23 14.2

*Uncorrected LC-MS data for 4b:518, 4e: 462

(c) Antifungal Activities

In vitro fungicidal activity of all the compounds was screened. Plant pathogenic organisms used wereNigrospora Sp, Aspergillusniger, Botrydepladiathiobromine, and Rhizopusnigricum, Fusariumoxyporium. The antifungal activity of all the compounds (3a-e) & (4a-e) were measured on each of these plant pathogenic strains on a potato dextrose agar (PDA) medium. [15]

The fungicidal activity displayed by various compounds (3a-e) and (4a-e) is shown in Table-3.

Table-3
Antifungal Activity of Compounds (3a-e) and (4a-e)

Zone of Inhibition at 1000 ppm (%)				
Comp.	**BT**	**NS**	**PE**	**RN**
3a	45	47	46	52
3b	52	54	54	58
3c	47	50	49	54
3d	50	52	50	56
3e	48	49	47	53
4a	57	67	62	59
4b	60	70	66	69
4c	58	69	64	61
4d	66	75	70	65
4e	59	66	63	63

BT-BotrydepladiaThiobromine,NS- Nigrosspora Sp.
PE- PenicilliumExpansum,RN- RhizopusNigricuns

III RESULTS AND DISCUSSIONS

The 4-(naphthalen-2-yl)thiazol-2-amine (1) on reaction with different hetero aryl aldehydes (2a-e) gives N-(arylmethylene)-4-(naphthalen-2-yl)thiazol-2-amine (3a-e).

The structures of **(3a-e)** were confirmed by elemental analysis and IR spectra showing an absorption bands at 3030-3080 cm^{-1}(C-H of Ar), 710 cm^{-1} (C-S),1120 cm^{-1} (C-O), 1555, 1375(-NO_2),690 cm^{-1} (C-Br) and 1620-1640 cm^{-1} (C=N).^{1}H NMR (400MHz , DMSO - d_6 ,δ / ppm) : 8.45-7.65(m,8H,Ar-H),7.54(s,1H,CH=N),**(3a)**: 7.78-7.00 (m,3H, furan-H); **(3b)**: 7.10-6.85(m,2H,furan-H); **(3c)**: 7.60-7.10(m,2H,furan-H);**(3d)**:7.72-7.20(m,3H,thiophen-H); **(3e)**: 8.70-8.00(m,4H,pyridineH).The C, H, N analysis data of all compounds are presented in Table-1.

The 3-aryl-6-(naphthalen-2-yl)-2-phenyl-2H-thiazolo[3,2-a][1,3,5]triazine-4(3H)-thione (4a-e) synthesised from compounds (3a-e) and phenyl isocyanate. The structures of **(4a-e)** were confirmed by elemental analysis and IR spectra showing an absorption bands at 3030-3080 cm^{-1}(C-H of Ar), 710 cm^{-1} (C-S),1620-1640 cm^{-1} (C=N),1273 (C=S),1120 cm^{-1} (C-O), 690 cm^{-1} (C-Br) and 1555, 1375(-NO_2).^{1}H NMR (400MHz , DMSO - d_6 ,δ / ppm) : 7.10-8.70(m,14H,Ar-H), **(4a)**: 7.80-6.98 (m,3H, furan-H); **(4b)**: 7.15-6.80 (m,2H,furan-H); **(4c)**: 7.65-6.98(m,2H,furan-H); **(4d)**:7.50-7.10(m,3H,thiophen-H); **(4e)**: 8.60-7.90(m,4H,pyridineH).

All the elemental and spectral features suggest that the data are consistent with the predicted structure shown in Scheme-1. The LC-MS of selected compounds shows the peak of M^+ ion which is consistent of their molecular weight. All these facts confirm the structures (3a-e) and (4a-e).

The examination of antifungal activity data reveals that all compounds exhibited moderate to good antifungal activity and the compounds **4b** and**4d** found more active.

IV CONCLUSION

A novel thiazole-triazine containing heterocyclic compounds has been synthesised from thaizole containing schiff's base with phenyl isocyanate. The synthesised compounds structure was confirmed by elemental as well as spectral studies. All these compounds show moderate to good antifungal activity.

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