# SYNTHESIS OF SOME TETRAZOLE AND THIAZOLIDINE-4-ONE DERIVATIVES OF SCHIFF BASE BY USING IONIC LIQUIDS AS CATALYST AND EVALUATION OF THEIR ANTIFUNGAL AND ANTIBACTERIAL ACTIVITY

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## Abstract

Compound (1a) (1-amino-4-methyl-6-phenyl pyrimidine- 2-(1H)-thione) was synthesized in the current study. By using a tetrabutylammonium iodide (TBAI) as a catalyst to react with various aromatic aldehydes in distilled water to give a new series of Schiff's bases (2a-2h ). New tetrazole derivatives (3a-3h) were made by reacting Schiff's bases (2a-2h) with sodium azide in $H_2O$. New thiazolidine-4-one was prepared from reactions of Schiff's bases (2a-2h) with thioglycolic acid in distilled water-giving compounds (4a-4h). Finally, The structure of the synthesized compounds is confirmed by,$^1$H NMR, IR, and $^{13}$C-NMR spectra as well as some physical data.

**Keywords**: tetrazole, thiazolidinone, Schiff bases, Ionic Liquids.

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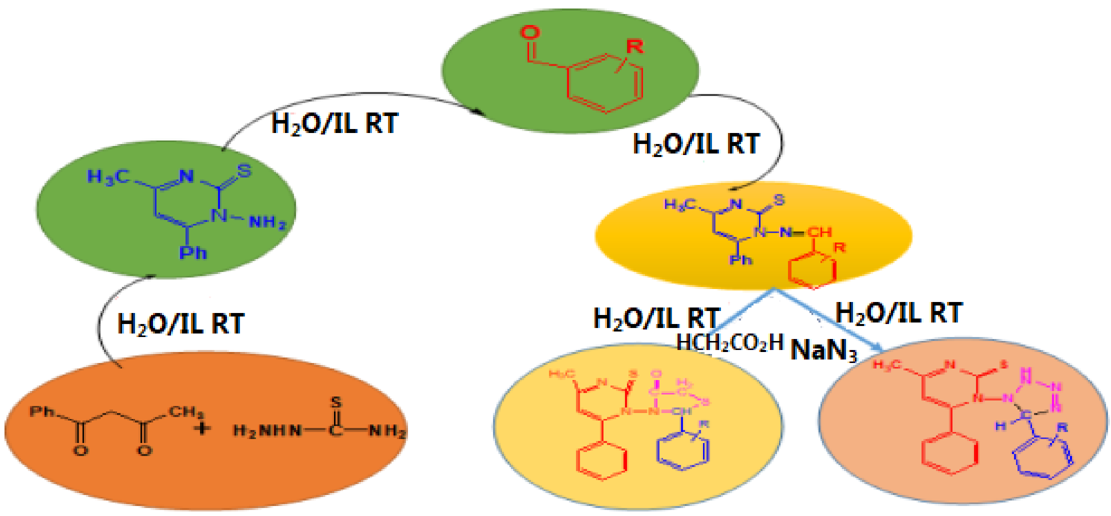
**Introduction**

Schiff's bases are a significant group of organic compounds (1a). Hugo Schiff first reported them in 1864 [1]. Schiff's bases are formed by the condensation of primary amines with carbonyl compounds. Azomethine is a structural feature shared by these compounds, and $R^1$ can be alkyl, aryl, cycloalkyl, or heterocyclic [2]. A Schiff's base (also known as imine or azomethine) is the nitrogen analog of an aldehyde or ketone in which the carbonyl group (>C = O) has been replaced by an imine or azomethine group. Schiff's bases have also been shown to have antifungal, antibacterial, antimalarial, antiproliferative, anti-inflammatory, antiviral, and antipyretic properties [3,4]. Imine or azomethine groups can be found in a wide range of natural, naturally derived, and nonnatural compounds. The presence of an imine group in such compounds is essential for their biological activities [5-7]. Because of their wide range of industrial applications, Schiff's bases are important compounds [8]. Schiff's bases are used to photostabilize poly (vinyl chloride) polymers against photodegradation by ultraviolet radiation [9-11], as well as to improve poly(methyl methacrylate) degradation [12] and to prevent photodegradation of polystyrene by adding them to polymer films [13,14]. Thiazolidinones, which are important heterocyclic compounds with sulfur and nitrogen in a five-member ring, are the derivatives of thiazolidine. It is regarded as a magical moiety that is capable of almost all biological functions. Due to their intriguing and varied pharmacological activities, which include, antifungal, antibacterial, antiproliferative, anti-inflammatory, and anti convulsant properties, compounds from the thiazolidinone series are synthesized, and this represents an important research area. Tetrazole is an aromatic azapyrrazole. It is a five-membered ring compound with one carbon, four nitrogen, two hydrogen, and two double bonds. Tetrazoles do not exist in the natural world. $CN_4H_2$ is the most fundamental tetrazole. It has a faint, distinguishing odour and is a white to pale yellow crystalline solid. It is soluble in both alcohol and water. It is acidic in nature as a result of the four nitrogens that are present. The lone pair of one nitrogen provides two of the six Huckel-required electrons for tetrazoles, while the other four electrons are supplied by the other four ring atoms [15]. Since the weak mesomeric effect (+M) is outweighed by the strong electron-withdrawing inductive effect (-I) of the tetrazole ring, Tetrazole rings are deactivating groups because they have strong electron-withdrawing inductive effects (-I) compared to weak mesomeric effects (+M) [16]. Tetrazoles can be used as isosteric substitutes for different functional groups in the creation of biologically active substances because of this property. Tetrazole has experienced a renaissance in recent years, particularly as a substitute for carboxylic acids. Tetrazoles' biological characteristics result from their higher metabolic stability than the acid function [17]. As a result, there is an ongoing endeavour to develop a cost-effective and practical method for the synthesis of tetrazole and Thiazolidinone derivatives from Schiff bases. Thus, the use of an ionic liquid as a catalyst is from an environmentally sustainable and healthy point of view in the presence of a free solvent at room temperature and good results are obtained in a short time. The acquired findings were compared regarding reaction time and yield to the other reported methods for the synthesis of tetrazole and thiazolidin-4-ones.



## EXPERIMENTAL

BDH and Fluka are the sources of all chemicals and reagents. The type of melting point apparatus used to measure melting points were electrothermal. Shimadzu's FT-IR-8400 infrared spectrophoto meter was used to record the FT-IR spectra. NMR spectra for $^1$H and $^{13}$C. Acetone-d6 and $CDCl_3$ have used the solvents at 1400 (400 MHz).

### Synthesis of 1-amino-4-methyl-6-phenyl pyrimi dine- 2-(1H) thion (1a).

A mixture of (0.02 mole) of benzoyl acetone and (0.02 mole) of thiosemicarbazide in (15 ml) distilled water containing a few quantities of ionic liquid then reflux for 50 min. the product filtered, the solid recrystallized from ethanol to give the pale-yellow product (Yield: 97 %; m.p.161-163°C).

### Synthesis of Schiff bases (2a-2h)

A mixture of compound (1a) (0.02 mole) and different aromatic aldehyde (0.02 mole) in distilled water (15 ml) containing a few quantities of ionic liquid was stirred for 37 min. the solvent was evaporated under a vacuum, and the solid yield crystallized by methanol. Table 1 involved physical properties.

### Synthesis of Tetrazole derivatives(3a-3h)

For 77 min, reflux a mixture of compound (2a-c) (0.008 mole) dissolved in (15 ml) distilled water and (0.012 mole) sodium azide. Absolute ethanol was used to filter and recrystallize the product. Table 3 dealt with physical properties.

### Synthesis of Thiazolidinones derivatives (4a-4h)

Schiff bases (0.002 mole) and mercapto acetic acid (0.004 mole) were combined in 10 ml of distilled water (2a-c). Refluxed the mixture for 72 min, then produced the compound by treating it with potassium bicarbonate. ethanol filtered and crystallised the final product. Table 5 featured physical characteristics.

### Results and Discussion

The new Schiff bases were created by combining 1-amino-4-methyl-6-phenyl pyrimidine-2- (1H)-thione (1a) with a different aromatic aldehyde in distilled water with a catalytic amount of ionic liquids. The FT-IR spectra of Schiff's bases (2a-2h) revealed the absence of a carbonyl group peak and the appearance of new peaks at 1580-1606 cm$^{-1}$, which are attributed to the new azomethine (C=N) group. **Table. 1.** contains some spectral data. Schiff's bases (2a-2h) were combined with sodium azide in THF to produce tetrazole compounds (3a-3h). The disappearance of the FT-IR absorption bands at (1580-1599) cm$^{-1}$ provides strong evidence for the reaction's success. These absorption bands are caused by the stretching frequency of the (C=N) imine group. Furthermore, the FT-IR spectra of tetrazole revealed distinct absorption bands at (1441-1499) cm$^{-1}$ due to (N=N). Aside from that, the FT-IR spectra appeared in the band at (2077-2360) cm$^{-1}$, which was attributed to the azide group's stretching frequency. **Table. 3.** Contains some spectral data and showed a good yield (3a-3h). **Table. 5.** contains some spectral data. Thiazolidinoe compounds (4a-4h) were synthesised in distilled water by reacting Schiff's bases (2a-2h) with thioglycolic acid. Due to the (C=O) imide stretching frequency, the FT-IR spectrum showed sharp peaks at (1724-1700) cm$^{-1}$. good evidence for the reaction's success at this stage.

1-Amino-4-methyl-6-phenyl pyrimidine-2-(1H)-thione Compound (**1a**).
M.p.161-163 $^0$C; FT-IR (KBr ,cm$^{-1}$): 3198 (=C-H), 2998 (R-CH), 1598 Endo (C=N Exo), 1081 (C=S), 936 (N-N), 3267-3401($NH_2$); $^1$H NMR ($CDCl_3$ 400 MHz): d = 7.30-7.37 (m, 5H, Ar-H), 5.96 (s,1 H,H-C=C), 3.45-3.40 (dd, 2H, $NH_2$ ), 2.04 (s, 3H,$CH_3$ ). $^{13}$CNMR ($CDCl_3$, 400 MHz): d = 175.5 (C=S), 155.4 (C=N), 144.1, 128.7, 128.0, 124.0, 95.3 (Ar-H), 55.2 (C=C-H), 16.1 ($CH_3$) calculated for $C_{11}H_{14}N_4O_2S$ + 217 found.

4-methyl-1-{[1E).(2-nitrophenyl) methylene]amino} -6-phenyl pyrimidine-2(1H)-thione Compound (2a).
M.p. 227-229 $^0$C; FT-IR (KBr ,cm$^{-1}$): 3145 (=C-H), 2981 (R-CH), 1596 (C=N Exo), 1227 (C=S), 1026 (N-N), 1521-1342 NO2(asy/sym); $^1$ H NMR (acetone-d 6 , 400 MHz): d = 8.61 (s,1H, H-C=N), 8.5-8.1 (m, 4H, Ar-H), 7.5-7.7 (m,5H, Ar-H), 6.4 (s, 1H, H-C=C). 2.8 (s, 3H, $CH_3$ ). $^{13}$ C NMR (acetone -d 6 , 400 MHz): d = 180.2 (C=S), 148.9 (C=N), 140.0, 136.4, 133.2, 130.1, 121.3 (Ar-H), 28.4 ($CH_3$ ) calculated for $C_{18} H_{14} N_4 O_2 S$ + 350 found

4-methyl-1-{[1E).(4-nitrophenyl)methylene]amino} -6-phenyl pyrimidine-2(1H)-thione compound (2d)
M.p. 97-99 $^0$C; FT-IR (KBr ,cm$^{-1}$): 3089 (=C-H), 2986 (R-CH), 1580 (C=N Exo), 1270 (C=S), 1085 (N-N), 1513-1330 NO2(asy/sym); $^1$ H NMR (DMSO-d 6 , 400 MHz): d = 8.4 (s,1H, H-C=N), 8.2-8.1 (m, 4H, Ar-H), 7.4-7.3 (m, 4H, Ar-H), 6.4 (s, 1H, H-C=C). 3.3 (s, 3H, $CH_3$ ). $^{13}$ C NMR (DMSO-d 6 , 400 MHz): d = 179.9 (C=S), 148.1 (C=N), 142.1, 140.0, 129.8, 125.5, (phenyl ring),

39.5 ($CH_3$ ) calculated for $C_{18}H14_4N_4O_2S$ + 350 found.

4-methyl-1-{[(1E). (4-amino phenyl)methylene] amino}-6-phenyl pyrimidine-2(1H)-thione Compound (2e).

M.p. 145-147 $^0$C; FT-IR (KBr ,cm$^{-1}$): 3076 (=C-H), 2963 (R-CH), 1606 (C=N Exo),1214 (C=S), 1103 (N-N), 3215-3473 ($NH_2$); $^1$ H NMR (DMSO-d 6 , 400 MHz): d = 10.7 (s, 2H, $2NH_2$ ), 7.8 (s, 1H, H-C=N), 6.8-7.31 (m, 4H, Ar-H), 7.38-7.46 (m, 5H, Ar- H), 1.67 (s, 3H, CH3 ). $^{13}$ C NMR (DMSO-d 6 , 400 MHz): d = 179.7 (C=S), 148.9 (C=N), 140.0, 136.5, 134.1, 131.2, 123.0, 121.0 ( phenyl ring) calculated for $C_{18}H_{16}N_4S$ +350 found

4-methyl- 1- {[(1E)-1- (4-methoxyphenyl) methy lene] amino} -6-phenyl pyrimidine-2(1H)-thione Compound (2f).

M.p. 133-135 $^0$C; FT-IR (KBr ,cm$^{-1}$): 3113 (=C-H), 2986 (R-CH), 1585 (C=N Exo), 1284 (C=S), 1084 (N-N), 1118-1224 (C-O-C) $^1$ H NMR (DMSO-d 6 , 400 MHz): d = 8.9 (s, 1H, H-C=N), 8.7 (s, 1H, H-C=C), 8.3-8.0 (m, 5H, Ar-H), 7.1-7.7 (m, 5H, Ar-H), 3.8 (s,3H,$OCH_3$ ). $^{13}$ C NMR (DMSO-d 6 ,400 MHz): d = 160.1 (C=S), 150.3 (C=N), 131, 130, 128, 124, 117, 115 (phenyl ring), 59 ($OCH_3$ , 55 (C=C-H). (Dhanya et al ., 2014).$2CH_3$ ). 13 C NMR (acetone -d 6 , 400 MHz): d = 141.2, 134.6, 133.1, 130.3, 128.8, 128.6, 124.8, 124.5,122.0 (phenyl ring), 29.5 ($CH_3$ ) calculated for $C_{19}H_{17}N_3OS$ +335 found.

1,1'- ((1,4- phenylenebis (methaneylylidene)) bis (azaneylylidene))bis(4-methyl-6-phenylpyrimidine -2(1H)-thione) Compound (2g)**.**

M.p. 142-144-326$^0$C; FT-IR (KBr ,cm$^{-1}$): 3195 (=C-H), 2988 (R-CH), 1590 (C=N Exo), 1225 (C=S), 1097 (N-N); $^1$ H NMR (acetone-d 6 , 400 MHz): d = 8.68 (s,1H, H-C=N), 8.08-8.20 (m, 4H, Ar-H), 7.55- 7.88 (m, 10H, Ar-H), 5.3 (s, 1H, C=C-H), 2.85 (br, 6H, $2CH_3$ ). $^{13}$ C NMR (acetone -d 6 , 400 MHz): d = 141.2, 134.6, 133.1, 130.3, 128.8, 128.6, 124.8, 124.5,122.0 (phenyl ring), 29.5 (CH 3 ) calculated for $C_{30}H_{24}N_6S$ +533 found.

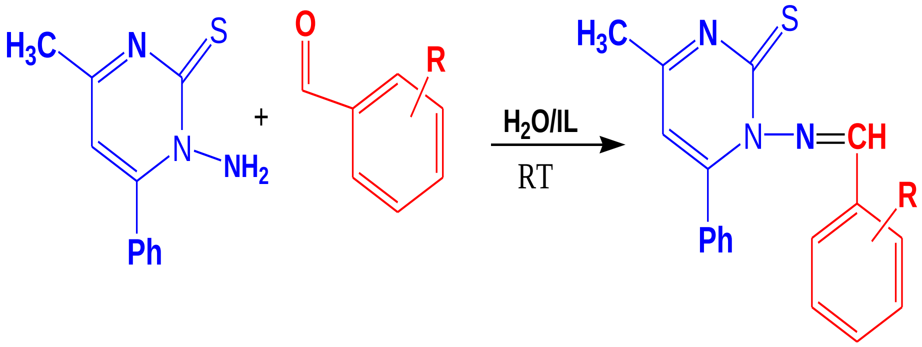
4-methyl-1-[5-(2-nitro phenyl)-2,5-dihydro-1H-tetrazol-1-yl]-6-phyenyl pyrimidine-2(1H)-thione Compound (3d).

M.p. 270-272 $^0$C; FT-IR (KBr ,cm$^{-1}$): 3356 (N-H) 3159 (=C-H), 2962 (R-CH), 1207 (C=S), 911 (N-N), 1447 (N=N) $^1$ H NMR (DMSO-d 6 , 400 MHz): d = 11.6 (s,1H, NH), 8.7 (s, 1H, C=C-H), 8.1-8.4 (m, 4H, Ar-H), 7.2- 7.7 (m, 5H, Aar-H), 4.1 (s, 1H, H-C-N ). 3.4 (s, 3H, CH 3 ). $^{13}$ C NMR (DMSO-d 6 , 400MHz): d = 179.1 (C=S), 155 (C=N), 149, 140, 135, 134, 131, 129, 128, 129, 124, 122, (phenyl ring), 95 (C=C-H), 55 (HC-N), 16 ($CH_3$) calculated for $C_{18}H_{15}N_7O_2S$ +393 found.

3-(4-methyl-6-phenyl-2-thioxo pyrimidin-1(2H)-yl)-2-(4-nitrophenyl)-1,3-thiazolidin-4-one Compound (4b).

M.p.186-188 $^0$C; FT-IR (KBr ,cm$^{-1}$): 3024 (=C-H), 2982 (R-CH), 1207 (C=S), 933 (N-N), 1704 (c=o) imide, 809 (C-S-C); $^1$ H NMR ($CDCl_3$ , 400 MHz): d = 8.20 – 8.26 (m,4H, Ar-H), 7.52-7.87 (m, 5H, Ar-H), 6,98, (S, 1H, H-C-N), 5.77 (s, 1H, H-C=C), 4.40 (br, 2H, $CH_2$ ), 2.34 (s, 3H, $CH_3$) calculated for $C_{20}H_{16}N_4O_3S_2$ +533 found.

**Table. 1.** Some physical properties of shiff base (2a-2h)



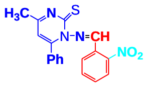
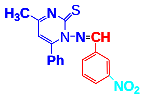
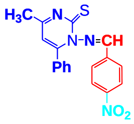
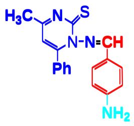
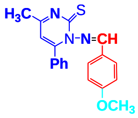
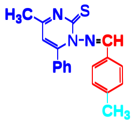
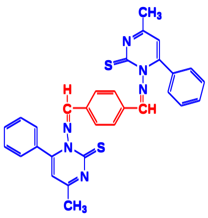
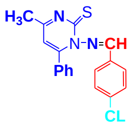
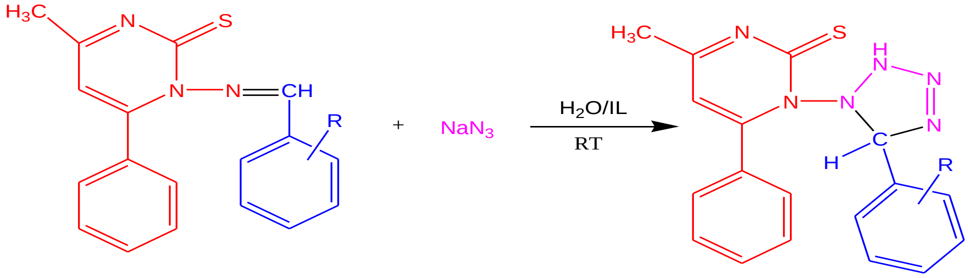
| Comp.No | Structure | M.P. °C | Colour | Time(min) | Yield 100% | Cryst. Solvent |
|---|---|---|---|---|---|---|
| 2a |  | 227-229 | White | 15 | 94 | Ethanol |
| 2b |  | 187-189 | White | 17 | 89 | Ethanol |
| 2c |  | 235-237 | Yellow | 16 | 91 | Ethanol |
| 2d |  | 97-99 | Light Yellow | 23 | 93 | Methanol |
| 2e |  | 145-147 | Pale yellow | 27 | 87 | Ethanol |
| 2f |  | 133-135 | White | 19 | 91 | Methanol |
| 2g |  | 324-326 | Brown | 33 | 85 | Ethanol |
| 2h |  | 177-199 | White | 37 | 93 | Methanol |

**Table. 2.** Comparative study of various catalysts as well as a solvent in recent work and TBAI for maximum yield of Schiff base

| Entry | Catalyst | Solvent | Temperature ($C^O$) | Time | Yield(%) | Ref |
|---|---|---|---|---|---|---|
| **1** | **amino acid** | **$H_2O$** | **35** | **6(h)** | **39** | **18** |
| **2** | **amino acid** | **EtOH** | **80** | **6(h)** | **60** | **19** |
| **3** | **[BMIM][NTf2]** | **decane** | **55** | **271(min)** | **62** | **20** |
| **4** | **PIL-SB-Mn(III)** | **EtOH** | **100** | **6(h)** | **60** | **21** |
| **5** | **PIL-SB-Mn(III)** | **H2O** | **RT** | **12(h)** | **55** | **21** |
| **6** | **SYSU-Zn@IL2** | **DMF** | **12(h)** | **12(h)** | **88** | **22** |
| **7** | **TBAI** | **THF** | **RT** | **10(h)** | **77** | **presnt work** |
| **8** | **TBAI** | **EtOH** | **80** | **8(h)** | **79** | **presnt work** |
| **9** | **TBAI** | **H2O** | **RT** | **30(min)** | **94** | **presnt work** |

**Table. 3.** Some physical properties of Tetrazole (3a-3h)



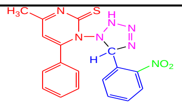
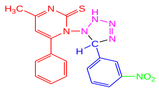
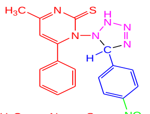
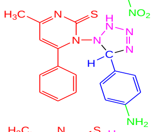
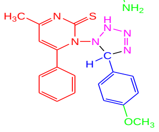
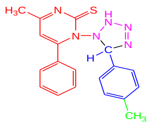
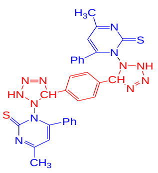
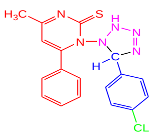
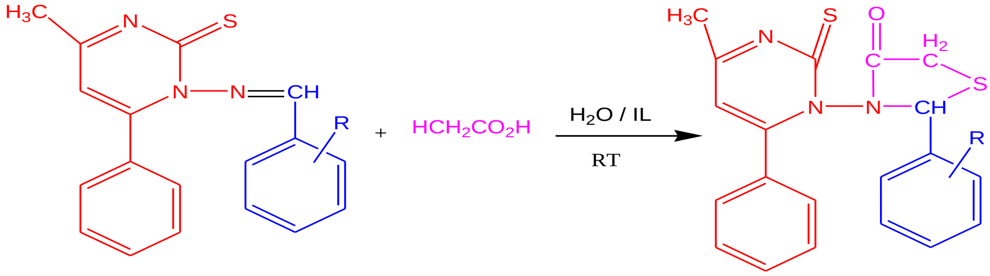

| Comp.No | Structure | M.P. °C | Colour | Time(min) | Yield 100% | Cryst. Solvent |
|---|---|---|---|---|---|---|
| 3a |  | 202-204 | Brown | 51 | 88 | Ethanol |
| 3b |  | 230-232 | Light Brown | 63 | 90 | Ethanol |
| 3c |  | 252-245 | Yellow | 47 | 84 | Ethanol |
| 3d |  | 270-272 | Yellow | 51 | 89 | Methanol |
| 3e |  | 195-197 | Llight Brown | 63 | 91 | Methanol |
| 3f |  | 188-190 | Dark Brawn | 71 | 87 | Methanol |
| 3g |  | 268-270 | Yellow | 77 | 90 | Ethanol |
| 3h |  | 222-224 | yellow | 52 | 88 | Ethanol |

**Table. 4.** Comparative study of various catalysts as well as a solvent in recent work and TBAI for maximum yield of Tetrazole

| Entry | Catalyst | Solvent | Temperature ($C^{O}$) | Yield(%) | Time | Ref |
|---|---|---|---|---|---|---|
| **1** | **[Bmim]BF4** | **Ethanol** | **100** | **75** | **7(h)** | **23** |
| **2** | **[bmim][$CF_3SO_3$** | **Ethanol** | **100** | **79** | **5(h)** | **24** |
| **3** | **{BiPy]$(SO_3H)_2Cl_2$** | **EG** | **80** | **89** | **1.5(h)** | **25** |
| **4** | **Amberlyst-15** | **DMSO** | **85** | **82** | **12(h)** | **26** |
| **5** | **$ZnBr_2$** | **$H_2O$** | **Reflux** | **76** | **24(h)** | **27** |
| **6** | **TBAI** | **THF** | **100** | **84** | **8(h)** | **present work** |
| **7** | **TBAI** | **Ethanol** | **100** | **87** | **10(h)** | **present work** |
| **8** | **TBAI** | **$H_2O$** | **RT** | **92** | **66(min)** | **present work** |

**Table. 5.** Some physical properties of thiazolidinone (4a-4h)



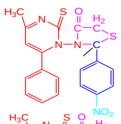
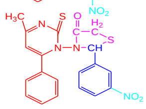
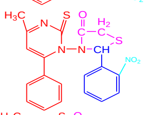
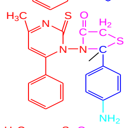
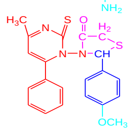
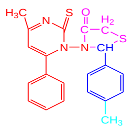
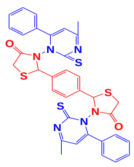
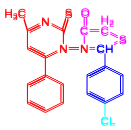
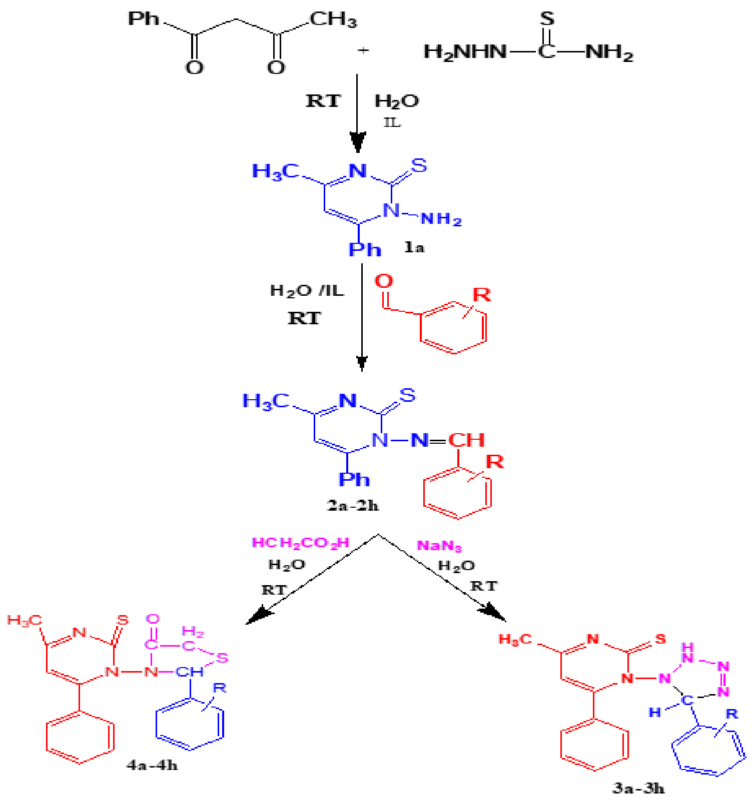

| Comp.No | Structure | M.P. °C | Colour | Time(min) | Yield 100% | Cryst. Solvent |
|---|---|---|---|---|---|---|
| 4a |  | 180-182 | Green | 57 | 91 | Ethanol |
| 4b |  | 186-188 | Whait | 63 | 89 | Ethanol |
| 4c |  | 252-254 | Yellow | 47 | 84 | Ethanol |
| 4d |  | 191-193 | Green | 51 | 88 | Methanol |
| 4e |  | 195-197 | Brown | 61 | 90 | Methanol |
| 4f |  | 185-187 | Dark Brawn | 71 | 87 | Methanol |
| 4g |  | 318-320 | Yellow | 72 | 90 | Ethanol |
| 4h |  | 212-214 | yellow | 51 | 89 | Ethanol |

**Table. 6.** Comparative study of various catalysts as well as a solvent in recent work and TBAI for maximum yield of Thiazolidinones

| Enty | Catalyst | Solvent | Temperature ($C^O$) | Yield (%) | Time | compound | Ref |
|---|---|---|---|---|---|---|---|
| 1 | $Co_3O_4$@p{AVIM}Br | $H_2O$ | 25 | 79 | 2(h) | 4v | 28 |
| 2 | [bmim][$PF_6$] | Ethanol | 80 | 59 | 4(h) | 4h | 29 |
| 3 | [MOEMIM]TFA | Ethanol | 80 | 78 | 3(h) | 1d | 30 |
| 4 | MNP[pmim]$HSO_4$ | solvent-free | 80 | 78 | 7(h) | 8 | 31 |
| 5 | [HDBU][$HSO_4$] | solvent-free | 80 | 80 | 2(h) | 8 | 32 |
| 6 | TBAI | $H_2O$ | RT | 91 | 81(min) | 4a | present work |




R=2NO2, 3NO2, 4NO2, 4NH2,4OCH3, 4CH3, 4CL, 4OH

**Antimicrobial activity**

The products were examined for their antimicrobial activity by the method of spreading the cup plate by measuring the inhibition areas in milli metres at concentrations of 50 µg against S. Paratyphi-A E. coli, S. aureus and then all the compounds were tested for their antimicrobial activity as in **Table. 7.** During the examination in **Table. 7.** The compounds 2C,3C and 4C are moderately active, while 2d, 3b and 4b are considered more active, and the remaining compounds are less active compared to the standard drugs. Penicillin and Ampicillin are used as standard antibacterial drugs. Also, all the prepared compounds were examined against the fungal strains A. niggers and F. molariform. The compounds 2a, 2b, 3a and 4a showed us the maximum inhibition in the range 46.42% - 77.22% is the most active against all of the fungal species compared to the standard drugs. The remaining compounds showed moderate activity. Fungigural and Griseofulvin are used as standard anti-fungal medicines.

**Table 7.** Antimicrobial data of compounds 2,3,4(a-h)

| Compound No | R | Antibacterial activity: Diameter of a zone of inhibition in mm | | | | Antifungal activity: %Inhibition | |
|---|---|---|---|---|---|---|---|
| | | S. Paratyphi-A | S. aureus | E. coli | B. subtilis | F. molaniforme | A. niger |
| 2a | $2NO_2$ | 05 | 11 | 07 | 08 | 57.55 | 45.35 |
| 2b | $3NO_2$ | 05 | 08 | 07 | 09 | 63.33 | 69.21 |
| 2c | $4NO_2$ | 13 | 12 | 10 | 15 | 77.22 | 67.45 |
| 2d | $4NH_2$ | 17 | 19 | 16 | 15 | 46.78 | 62.30 |
| 3a | $2NO_2$ | 07 | 09 | 11 | 06 | 54.25 | 59.34 |
| 3b | $3NO_2$ | 13 | 16 | 18 | 18 | 59.79 | 69.40 |
| 3c | $4NO_2$ | 11 | 12 | 11 | 14 | 46.42 | 43.42 |
| 4a | $2NO_2$ | 09 | 05 | 07 | 05 | 57.32 | 55.87 |
| 4b | $3NO_2$ | 16 | 15 | 15 | 17 | 46.55 | 40.57 |
| 4c | $4NO_2$ | 12 | 15 | 11 | 13 | 57.45 | 56.44 |
| Ampicillin | ----- | 31 | 33 | 35 | 35 | ----- | ----- |
| Penicillin-G | ----- | 32 | 30 | 30 | 33 | ----- | ----- |
| Griseofulvin | ----- | ----- | ----- | ----- | ----- | 86 | 81 |
| Fungiguard | ----- | ----- | ----- | ----- | ----- | 78 | 77 |

## Conclusion

From the experiment, it was concluded that the synthesis of tetrazole and Thiazolidine-4-One were prepared safe and simple with a good product yield, was prepared through this research by using a new tetrabutylammonium iodide (TBAI) to accelerate the synthesis of derivatives of both tetrazole and Thiazolidine-4-One from Schiff bases in an aqueous medium using an environmentally friendly material, which is not harmful to the environment. A non-toxic, reusable, and thermally stable catalyst that was used in an aqueous medium instead of organic solvents, making it a superior, environ mentally friendly approach and alternative to previous methods. Using this catalyst, tetrazole and Thiazolidine-4-One derivatives were synthesized with good results and a high percentage and also yield, the antifungal and antibacterial activity was evaluated with good results as shown in **Table. 7.**

## Acknowledgements

## Conflict of interest

The authors declare no conflict of interest

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