Chemistry & Biology Interface, 2022, 12, 2, 37-54

REVIEW PAPER ISSN: 2249 –4820

CHEMISTRY & BIOLOGY INTERFACE

An official Journal of ISCB, Journal homepage; www.cbijournal.com

# Synthesis and biological activities of Chalcone and Pyrimidine derivatives of imidazothiazole moiety

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**Received; 03 March 2022, Accepted; 04April 2022**

**Abstract:** Target molecules based on imidazothiazole-chalcone derivatives and imidazothiazole-pyrimidine derivatives were synthesized. Chalcone series of 3-(2-(4-methoxybenzyl)-5-(3-oxo-3-substituted-phenyl-prop-1-en-1-yl)imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2H-chromen-2-one(6a-j) was synthesized by reaction between 2-(4-methoxybenzyl)-6-(2-oxo-2H-chromen-3-yl)imidazo[2,1-b][1,3,4]thiadiazole-5-carbaldehyde(5) and various substituted acetophenone and these chalcone were converted into pyrimidine series such as 3-(5-(2-amino-6-substituted-phenylpyrimidin-4-yl)-2-(4-methoxybenzyl)imidazo[2,1-b][1,3,4] thiadiazol-6-yl)-2H-chromen-2-one(7a-j). These derivatives of chalcones and pyrimidine were examined in vitro for antimicrobial and antifungal activities against clinically isolated strains and their characterization was confirmedby FTIR, $^{1}$H-NMR, $^{13}$C and LCMS.

**Keywords:** Imidazothiazole-chalcone, Imidazothiazole-pyrimidine, Imidazothiazole, 2H-chromen,Imidazole, thiadiazole-5-carbaldehyde, antimicrobial, activities.

## Introduction

Imidazothiadiazole derivatives have their own important in medicinal chemistry [1-4]. In the field of pharmaceutical chemistry, the derivatives of chalcones and pyrimidines have occupied notable place. Their biological activities find applications as hypnotics, sedatives and anesthetic drugs. Chalcone compounds are known intermediates to prepare various heterocyclic compounds and the derivatives are reported to possess various biological activities [5-13]. Chalcone structure contains double bonds in conjugation to carbonyl group and that is considered as responsible for pharmacological effect. According to literature survey it is clear that chalcones exhibited broad spectrum of biological activities viz. anticancer [14], antimalarial [15], antimicrobial [16], antioxidant [17], anti-inflammatory [18] etc. Heterocyclic compounds having Nitrogen atoms also contain good biological activities [19-20].

Pyrimidines are one of the heterocyclic compounds containing six-membered unsaturated ring structures and two nitrogen atoms at position 1 and 3.

They possess broad range of pharmacological activities such as anti-cancer [21], antimicrobial [22], anti-viral [23-24], anti-HIV [25-26], anti-hypertensive [27], anti-convulsant [28], anti-tubercular [29], anti-bacterial [30] and anti-fungal [31] properties.

## Materials and methods:

All the chemicals used were of A R Grade reagent and were used without further purification. Melting points were taken using open capillary and are uncorrected. Progress of the reactions was checked by thin-layer chromatography (TLC) using E. Merck silica gel GF254 plates, methanol and toluene used as solvent system, visualization of the developed chromatogram was performed byUV light (254 nm). The FT-IR spectra was obtained using KBr pellets on Perkin-Elmer 1600 FTIR in KBr disc.The $^{1}H$ NMR and $^{13}C$ NMR spectra were recorded on Bruker 500 MHz in DMSO-$d_6$ as a solvent using tetramethyl silane (TMS) as internal standard respectively. LC-MS were obtained using LCMS.

### Preparation of 5-(4-methoxybenzyl)-1,3,4-thiazol-2-amine (1)

A mixture of *p*-methoxy phenyl acetic acid (0.01mole) and thiosemicarbazide (0.01mole) in 45mL $POCl_3$ was refluxed gently for 45 minutes. The reaction mixture was then cooled and quenched with 100 mL cold water carefully.

The resulting solution was refluxed for additional 4 hours and filtered while hot to remove unreacted reactants. The filtrate was cooled and basified with aqueous potassium hydroxide solution. The solid separated was filtered, washed with distilled water, dried and recrystallized from ethanol. Yield; 88.24%, m.p. 195-197º C, IR (KBr, $cm^{-1}$): υ = 3257, 3105, 2972, 2927 $cm^{-1}$. $^{1}H$ NMR (500MHz, $CDCl_3$-$d_6$) δ; 3.83 (s, 3H, $OCH_3$), 4.15 (s, 2H, $CH_2$), 5.7 (s, 2H, $NH_2$), 6.86-7.28 (m, 4H, Ar-H), (Scheme-1).

### Preparation of 3-acetyl-2*H*-chromen-2-one (2)

The mixture of 0.01 mole salicylaldehyde and 0.01 mole ethyl acetoacetate (EAA) were taken in 75 mL methanol. About 2 mL diethyl aniline was added to the mixture while it was stirring at room temperature for about 2 hours to obtain solid.

The product was collected by filtration and recrystallized from ethanol. Yield; 91.11%, m.p. 113-115º C, IR (KBr, $cm^{-1}$): υ = 3028, 1720, 1678, 1557, 1454, 1210 $cm^{-1}$. $^{1}H$ NMR (500MHz, $CDCl_3$-$d_6$) δ; 8.32 (s, 1H, $4^{th}$ position), 7.60 (m, 2H, $5^{th}$ and $8^{th}$ position), 7.37 (m, 2H, $6^{th}$ and $7^{th}$ position), 2.75 (s, $COCH_3$), (Scheme-2).

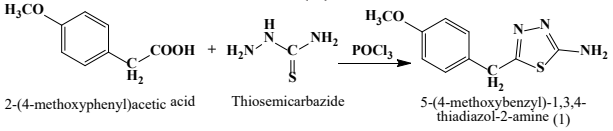
### Preparation of 3-(2-bromoacetyl)-2*H*-chromen-2-one (3)

0.01 mole of 3-acetyl-2*H*-chromen-2-one **(2)** was dissolved in 100 mL chloroform, 0.011 mole $Br_2$ in 10 mL chloroform was added dropwise into warm solution in RBF (round bottom flask). After the addition, mixture was heated in water bath for about 20 minutes.

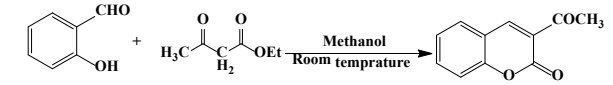
Then mixture was cooled and solid separated was filtered. Wash of diethyl ether was given to remove unreacted $Br_2$ and recrystallized from acetic acid, to give colourless needles. Yield; 82.87%, m.p. 170-171º C, IR (KBr, $cm^{-1}$): υ = 3028, 1720, 1678, 1557, 1454, 1210 $cm^{-1}$. $^{1}H$ NMR (500MHz, $CDCl_3$-$d_6$) δ; 8.41 (s, 1H, $4^{th}$ position), 7.65 (m, 2H, $5^{th}$ and $8^{th}$ position), 7.38 (m, 2H, $6^{th}$ and $7^{th}$ position), 4.43 (s, $COCH_2Br$),

(Scheme-3).

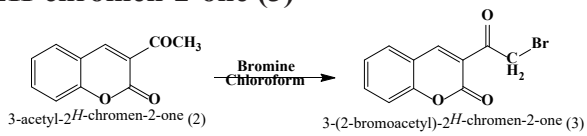
**Scheme-1; Synthesis of 5-(4-methoxybenzyl)-1,3,4-thiazol-2-amine (1)**




**Scheme-2; Synthesis of 3-acetyl-2*H*-chromen-2-one (2)**




**Scheme-3; Synthesis of3-(2-bromoacetyl)-2H-chromen-2-one (3)**




**Preparation of 3-(2-(4-methoxybenzyl)-imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one (4)**

A mixture of equimolar quantities of 5-(4-methoxybenzyl)-1,3,4-thiazol-2-amine **(1)** (0.01mole) and 3-(2-bromoacetyl)-2*H*-chromen-2-one **(3)** (0.01mole) was refluxed in dry ethanol for 8 hours. The excess of solvent was distilled off and hydrobromide salt that separated was collected by filtration, suspended in water and neutralized by aqueous sodium carbonate to get free base. It was filtered, washed with distilled water, dried and recrystallized from acetic acid. Yield; 70.45%, m.p. 202-204º C, IR (KBr, $cm^{-1}$): υ = 3257, 3105, 2972, 2927, 1720, 1678, 1557, 1454, 1210 $cm^{-1}$. $^1$H NMR (500MHz, $CDCl_3$-$d_6$) δ; 3.83 (s, 3H, $OCH_3$), 4.15 (s, 2H, $CH_2$), 6.90-7.30 (m, 4H, Ar-H), 8.43 (s, 1H, 4$^{th}$ position), 7.66 (m, 2H, 5$^{th}$ and 8$^{th}$ position), 7.39 (m, 2H, 6$^{th}$ and 7$^{th}$ position), 7.14 (s, 1H, imidazole), (Scheme-4).

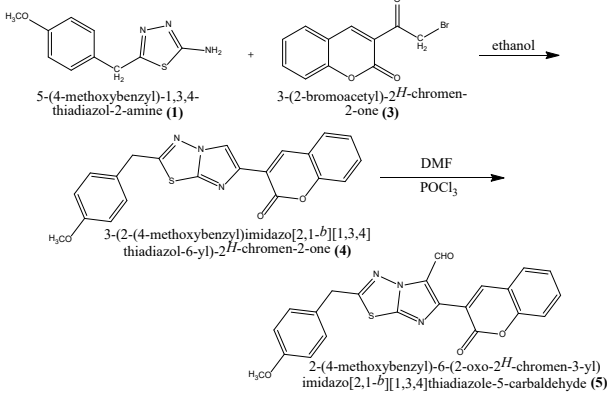
**Preparation of 2-(4-methoxybenzyl)-6-(2-oxo-2*H*-chromen-3-yl)imidazo[2,1b][1,3,4] thiadiazole-5-carbaldehyde (5)**

**Vilsmeier-Haack formylation;**

In the first part Vilsmeier-Haack reagent was prepared by adding 3 mL $POCl_3$ into 15 mL DMF at 0º to 5º C by stirring the mixture for 10 minutes.3-(2-(4-methoxybenzyl)-imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one **(4)**was added slot wise in the mixture of Vilsmeier-Haack reagent. This mixture was stirred at 0º to 5º C for 30 minutes and stirred at further at 60º C for 1 hour and at room temperature for overnight. The completion of reaction was confirmed by TLC.

The reaction mixture was poured into crushed ice and the resulting product was filtered, washed with dist. water and dried. Yield; 65.19%, m.p. 207-209º C, IR (KBr, $cm^{-1}$): υ = 3257, 3105, 2972, 2927, 2750, 1720, 1678, 1557, 1454, 1210 $cm^{-1}$.$^1$H NMR (500MHz, $CDCl_3$-$d_6$) δ; 3.83 (s, 3H, $OCH_3$), 4.15 (s, 2H, $CH_2$), 6.90-7.30 (m, 4H, Ar-H), 8.43 (s, 1H, 4$^{th}$ position), 7.66 (m, 2H, 5$^{th}$ and 8$^{th}$ position), 7.39 (m, 2H, 6$^{th}$ and 7$^{th}$ position), 9.74 (s, CHO), (Scheme-4).

**Scheme-4; Synthesis of 3-(2-(4-methoxybenzyl)-imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one (4) and 2-(4-methoxybenzyl)-6-(2-oxo-2*H*-chromen-3-yl)imidazo[2,1,b][1,3,4] thiad iazole-5-carbaldehyde (5)**

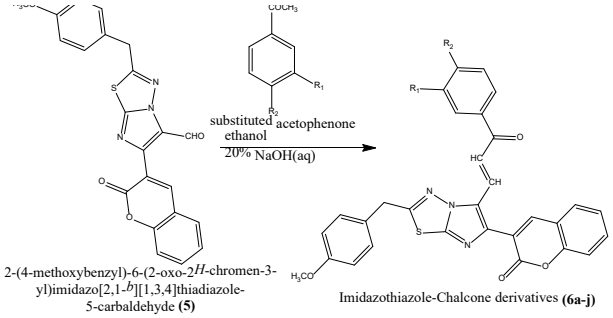



**Preparation of various imidazothiazole-chalcone derivatives ($RT_1$ to $RT_{10}$)**

In the RBF equimolar mixture of 2-(4-methoxybenzyl)-6-(2-oxo-2*H*-chromen-3-yl)imidazo[2,1-b][1,3,4]thiadiazole-5carbaldehyde**(5)** (0.01mole) and various

substituted acetophenone (0.01mole) were dissolved in 50mL ethanol. At room temperature, 20% aqueous solution of NaOH was added drop wise for 15 minutes. The mixture was stirred for additional 2 hours and left overnight. This reaction mixture was poured into ice crushed and acidified with diluted aqueous solution of HCl and crystallized from ethanol and purified by dissolving in minimum ethyl acetate and solidified by adding n-hexane drop by drop in ice bath to yield pale yellow solid, it was filtered and dried. (Scheme-5).

**Scheme-5; Synthesis of imidazothiazole-chalcone derivatives ($RT_1$ to $RT_{10}$)**




**(6a-$RT_1$)3-(2-(4-methoxybenzyl)-5-(3-oxo-3-phenylprop-1-en-1-yl)imidazo[2,1-b][1,3,4] thiadiazol-6-yl)-2*H*-chromen-2-one.**

The structure of the compound $RT_1$(m.p. 225-227ºC, Yield;72.36%) was confirmed by $^1$H NMR, $^{13}$C NMR and LCMS analysis; IR (KBr, cm$^{-1}$): ν= 3029, 2157, 1720, 1670, 1652, 1570, 1237, 749. $^1$H NMR (500 MHz, DMSO-$d_6$) δ;3.81 (s, 3H of methoxy group), 4.18 (s, 2H of methylene group), 7.69 (d, 1H of HC= ethylene group), 6.79 (d, 1H of HC=CO-), 7.49-8.13 (m, 5H of Ar-H), 6.68-7.19 (m, 4H of Ar-H), 7.57-7.74 (m, 5H of Ar-H). $^{13}$C NMR (500 MHz, DMSO-$d_6$) δ; 39.5 (1Cof methylene group), 56.4 (1C of methoxy group), 133.8, 133.8, 164.9, 165.9 (4C of imidazothiazole),119.7 (1C of HC= ethylene group), 122.3 (1C of =CH bonded with carbonyl group), 188.9 (C=O bonded with alkene), 115.9, 118.4, 126.9, 127.5, 128.5, 129.6, 136.9, 154.2, 165.7 (9C of coumarin), 114.4, 114.4, 130.2, 130.2, 137.6, 159.8 (6C of benzene ring), 127.8, 128.5, 128.5, 129.1, 129.1, 135.6 (6C of benzene ring). EIS-MS: m/z 519.13 (M+), 520.13 (M + 1), Anal. calculated for$C_{30}H_{21}N_3O_4S$; (519.13), calculated; C-69.35%, H-4.07%, N-8.09%, O-12.32%, S-6.17% Found; C-69.25%, H-4.00%, N-7.99%, O-12.12%, S-6.15%.

**(6b-$RT_2$)3-(2-(4-methoxybenzyl)-5-(3-(3-nitrophenyl)-3-oxoprop-1-en-1-yl) imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one.**

The structure of the compound $RT_2$(m.p.267-268ºC, Yield; 65.69%) was confirmed by $^1$H NMR, $^{13}$C NMR and LCMS analysis; IR (KBr, cm$^{-1}$): ν = 3029, 2157, 1720, 1670, 1652, 1570, 1237, 749. $^1$H NMR (500 MHz, DMSO-$d_6$) δ;3.94 (s, 3H of methoxy group), 4.22 (s, 2H of methylene group), 7.71 (d, 1H of HC= ethylene group), 6.82 (d, 1H of HC=CO-), 7.34-8.11 (m, 5H of Ar-H), 6.82-7.17 (m, 4H of Ar-H), 7.68-8.79 (m, 4H of Ar-H). $^{13}$C NMR (500 MHz, DMSO-$d_6$) δ; 39.5 (1Cof methylene group), 56.1 (1C of methoxy group), 133.8, 133.8, 164.9, 165.3, (4C of imidazothiazole),119.7 (1C of HC= ethylene group), 122.3 (1C of =CH bonded with carbonyl group), 188.9 (C=O bonded with alkene), 115.9, 118.4, 126.9, 127.5, 128.5, 129.6, 136.9, 154.2, 165.7 (9C of coumarin), 114.4, 114.4, 130.2, 130.2, 137.6, 159.8 (6C of benzene ring), 127.8, 128.5, 128.5, 129.1, 129.1, 135.6 (6C of benzene ring). EIS-MS: m/z 564.57 (M+), 565.57 (M + 1), Anal. calculated for$C_{30}H_{20}N_4O_6S$; (564.57), calculated; C-68.32%, H-3.57%, N-9.92%, O-17.00%, S-5.68% Found; C-68.25%, H-3.51%, N-9.87%, O-16.99%, S-5.67%.

**(6c-$RT_3$)3-(5-(3-(4-hydroxyphenyl)-3-oxoprop-1-en-1-yl)-2-(4-methoxybenzyl) imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one.**

The structure of the compound $RT_3$(m.p.260-263ºC, Yield; 53.36%) was confirmed by $^1H$ NMR, $^{13}C$ NMR and LCMS analysis; IR (KBr, $cm^{-1}$): ν= 3257, 3029, 2157, 1720, 1670, 1652, 1570, 1147, 1237, 749. $^1H$ NMR (500 MHz, DMSO-$d_6$) δ;3.90 (s, 3H of methoxy group), 4.23 (s, 2H of methylene group), 7.64 (d, 1H of HC= ethylene group), 6.76 (d, 1H of HC=CO-), 7.31-8.06 (m, 5H of Ar-H), 6.81-7.14 (m, 4H of Ar-H), 6.99-7.62 (m, 4H of Ar-H), 9.54 (s, 1H of phenolic OH group). $^{13}C$ NMR (500 MHz, DMSO-$d_6$) δ; 39.5 (1Cof methylene group), 56.4 (1C of methoxy group), 133.8, 133.8, 164.9, 165.3, (4C of imidazothiazole),119.7 (1C of HC= ethylene group), 122.3 (1C of =CH bonded with carbonyl group), 188.9 (C=O bonded with alkene), 115.9, 118.4, 126.9, 127.5, 128.5, 129.6, 136.9, 154.2, 165.7 (9C of coumarin), 114.4, 114.4, 130.2, 130.2, 137.6, 159.8 (6C of benzene ring), 127.8, 128.5, 128.5, 129.1, 129.1, 135.6 (6C of benzene ring). EIS-MS: m/z 564.57 (M+), 565.57 (M + 1), Anal. calculted for$C_{30}H_{21}N_3O_5S$; (535.12), calculated; C-67.28%, H-3.95%, N-7.85%, O-14.94%, S-5.99%. Found; C-67.22%, H-3.92%, N-7.84%, O-14.92%, S-5.97%.

**(6d-$RT_4$)3-(5-(3-(3-hydroxyphenyl)-3-oxoprop-1-en-1-yl)-2-(4-methoxybenzyl) imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one.**

The structure of the compound $RT_4$(m.p.238-240ºC, Yield; 51.28%) was confirmed by $^1H$ NMR, $^{13}C$ NMR and LCMS analysis; IR (KBr, $cm^{-1}$): ν= 3125, 3029, 2157, 1720, 1670, 1652, 1570, 1237, 1198, 749. $^1H$ NMR (500 MHz, DMSO-$d_6$) δ; 3.89 (s, 3H of methoxy group), 4.21 (s, 2H of methylene group), 7.62 (d, 1H of HC= ethylene group), 6.74 (d, 1H of HC=CO-), 7.29-8.03 (m, 5H of Ar-H), 6.78-7.17 (m, 4H of Ar-H), 6.94-7.64 (m, 4H of Ar-H), 9.50 (s, 1H of phenolic OH group). $^{13}C$ NMR (500 MHz, DMSO-$d_6$) δ; 39.3 (1Cof methylene group), 56.3 (1C of methoxy group), 133.8, 133.8, 164.4, 165.2, (4C of imidazothiazole),119.6 (1C of HC= ethylene group), 122.1 (1C of =CH bonded with carbonyl group), 188.6 (C=O bonded with alkene), 115.7, 118.3, 126.7, 127.5, 128.5, 129.3, 136.7, 154.2, 165.5 (9C of coumarin), 114.4, 114.4, 130.2, 130.2, 137.6, 159.8 (6C of benzene ring), 127.8, 128.4, 128.4, 129.0, 129.0, 135.5 (6C of benzene ring). EIS-MS: m/z 535.12 (M+), 536.12 (M + 1), Anal. calculted for$C_{30}H_{21}N_3O_5S$; (535.12), calculated; C-67.28%, H-3.95%, N-7.85%, O-14.94%, S-5.99%. Found; C-67.25%, H-3.90%, N-7.82%, O-14.91%, S-5.88%.

**(6e-$RT_5$)3-(5-(3-(4-bromophenyl)-3-oxoprop-1-en-1-yl)-2-(4-methoxybenzyl) imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one.**

The structure of the compound $RT_5$(m.p.267-269ºC, Yield; 66.36%) was confirmed by $^1H$ NMR, $^{13}C$ NMR and LCMS analysis; IR (KBr, $cm^{-1}$): ν= 3029, 2157, 1720, 1670, 1652, 1570, 1237, 749. $^1H$ NMR (500 MHz, DMSO-$d_6$) δ;3.88 (s, 3H of methoxy group), 4.22 (s, 2H of methylene group), 7.67 (d, 1H of HC= ethylene group), 6.75 (d, 1H of HC=CO-), 7.33-8.08 (m, 5H of Ar-H), 7.62-7.88 (m, 4H of Ar-H), 6.71-7.17 (m, 4H of Ar-H). $^{13}C$ NMR (500 MHz, DMSO-$d_6$) δ: 39.4 (1C of methylene group), 56.2 (1C of methoxy group), 133.9, 133.9, 165.2, 164.7 (4C of imidazothiazole),119.7 (1C of HC= ethylene group), 122.4 (1C of =CH bonded with carbonyl group), 189.01 (C=O bonded with alkene), 115.8, 118.2, 126.9, 127.3, 128.4, 129.4, 136.9, 154.1, 165.6 (9C of coumarin) 114.3, 114.3, 130, 130, 137.5, 159.8 (6C of benzene ring), 122.5, 129.9, 129.9, 1312.7, 132.7, 135.9 (6C of benzene ring). EIS-MS: m/z 597.04 (M+), 598.04 (M + 1), Anal. Calculated for $C_{30}H_{20}BrN_3O_4S$; (597.04), calculated; C-60.21%, H-3.37%, Br-13.35%, N-7.02%, O- 10.69%, S-5.36%. Found; C-60.18%, H-3.35%, Br, 13.28%; N, 6.99%; O,

10.59%; S, 5.31%.

**(6f-RT$_6$)3-(2-(4-methoxybenzyl)-5-(3-(4-methoxyphenyl)-3-oxoprop-1-en-1-yl) imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one.**

The structure of the compound RT$_6$(m.p.245-247ºC, Yield; 62.36%) was confirmed by $^1$H NMR, $^{13}$C NMR and LCMS analysis; IR (KBr, cm$^{-1}$): ν = 3029, 2157, 1720, 1670, 1652, 1570, 1237, 1149, 749. $^1$H NMR (500 MHz, DMSO-$d_6$) δ;3.82 (s, 6H of methoxy group),4.15 (s, 2H of methylene group), 7.62 (d, 1H of HC= ethylene group), 6.73 (d, 1H of HC=CO-), 7.27-8.02 (m, 5H of Ar-H), 6.82-7.10 (m, 4H of Ar-H), 7.09-7.53 (m, 4H of Ar-H). $^{13}$C NMR (500 MHz, DMSO-$d_6$) δ; 39.1 (1Cof methylene group), 56.08 (2C of methoxy group), 133.6, 133.6, 165.0, 164.8 (4C of imidazothiazole),119.6 (1C of HC= ethylene group), 122.2 (1C of =CH bonded with carbonyl group), 188.81 (C=O bonded with alkene), 116.8, 118.2, 126.9, 127.3, 128.4, 129.4, 136.9, 154.1, 165.6 (9C of coumarin) 114.3, 114.3, 130, 130, 137.5, 159.8 (6C of benzene ring), 114.4, 114.4, 130.5, 130.5, 135.4, 159.7 (6C of benzene ring). EIS-MS: m/z 549.14 (M+), 550.14 (M + 1), Anal. calculated for $C_{31}H_{23}N_3O_5S$; (549.14), calculated; C-67.75%, H-4.22%, N-7.65% O-14.56% S-5.83%. Found; C-67.71%, H-4.15%, N-7.62% O-14.52% S-5.82%.

**(6g-RT$_7$)3-(5-(3-(2,4-dihydroxyphenyl)-3-oxoprop-1-en-1-yl)methoxybenzyl) imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one.**

The structure of the compound RT$_7$(m.p. 234-233ºC, Yield; 66.47%**)** was confirmed by $^1$H NMR, $^{13}$C NMR and LCMS analysis; IR (KBr, cm$^{-1}$): ν= 3029, 2157, 1720, 1670, 1652, 1570, 1237, 749. $^1$H NMR (500 MHz, DMSO-$d_6$) δ; 2.57 (s, 3H of methyl group), 3.74 (s, 3H of methoxy group),4.13 (s, 2H of methylene group), 7.68 (d, 1H of HC= ethylene group), 6.75 (d, 1H of HC=CO-), 7.31-8.09 (m, 5H of Ar-H), 6.83-7.14 (m, 4H of Ar-H), 7.12-7.75 (d, 4H of Ar-H). $^{13}$C NMR (500 MHz, DMSO-$d_6$) δ; 39.2 (1Cof methylene group), 56.0 (1C of methoxy group), 133.7, 133.7, 164.7, 165.1, (4C of imidazothiazole),119.5 (1C of HC= ethylene group), 122.16 (1C of =CH bonded with carbonyl group), 188.84 (C=O bonded with alkene), 115.8, 118.2, 126.9, 127.3, 128.4, 129.4, 136.9, 154.1, 165.6 (9C of coumarin) 114.3, 114.3, 130, 130, 137.5, 159.8 (6C of benzene ring), 129, 129, 129.1, 129.4, 133.5, 141.5 (6C of benzene ring), 21.2 (1C of methyl group). EIS-MS: m/z 533.14 (M+), 534.14 (M + 1), Anal. calculated for $C_{31}H_{23}N_3O_4S$;(533.14), calculated; C-69.78%, H-4.34%, N-7.87% O-11.99% S-6.01%. Found; C-69.75%, H-4.30%, N-7.85% O-11.97% S-5.99%.

**(6h-RT$_8$)3-(2-(4-methoxybenzyl)-5-(3-(3-methoxyphenyl)-3-oxoprop-1-en-1-yl) imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one.**

The structure of the compound RT$_8$(m.p.238-239ºC, Yield; 60.25%**)** was confirmed by $^1$H NMR, $^{13}$C NMR and LCMS analysis; IR (KBr, cm$^{-1}$): ν= 3029, 2157, 1720, 1670, 1652, 1570, 1237, 1145, 749. $^1$H NMR (500 MHz, DMSO-$d_6$) δ;3.84 (s, 3H of methoxy group),3.79 (s, 3H of methoxy group),4.17 (s, 2H of methylene group), 7.91 (d, 1H of HC= ethylene group), 7.58 (d, 1H of HC=CO-), 7.28-8.02 (m, 5H of Ar-H), 6.83-7.14 (m, 4H of Ar-H), 6.97-7.83 (m, 4H of Ar-H), $^{13}$C NMR (500 MHz, DMSO-$d_6$) δ; 39.5 (1Cof methylene group), 56.12 (2C of methoxy group), 133.6, 133.6, 165.1, 164.7 (4C of imidazothiazole),119.5 (1C of HC= ethylene group), 122.1 (1C of =CH bonded with carbonyl group), 188.85 (C=O bonded with alkene), 115.8, 118.2, 126.9, 127.3, 128.4, 129.4, 136.9, 154.1, 165.6 (9C of coumarin) 114.3, 114.3, 130, 130, 137.5, 159.8 (6C of benzene ring), 106.5, 116.7, 129.0, 129.58, 132.8, 158.9

(6C of benzene ring). EIS-MS: m/z 551.12 (M+), 552.12 (M + 1), Anal. calculated for $C_{31}H_{23}N_3O_5S$;(549.13), calculated; C-67.75%, H-4.22%, N-7.64% O-14.55% S-5.83%. Found; C-67.72%, H-4.20%, N-7.56% O-14.51% S-5.78%.

**(6i-$RT_9$)3-(2-(4-methoxybenzyl)-5-(3-(4-nitrophenyl)-3-oxoprop-1-en-1-yl) imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one.**

The structure of the compound $RT_9$(m.p.272-274ºC, Yield; 69.87%) was confirmed by $^1$H NMR, $^{13}$C NMR and LCMS analysis; IR (KBr, cm$^{-1}$): ν= 3029, 2157, 1720, 1670, 1652, 1570, 1237, 749. $^1$H NMR (500 MHz, DMSO-$d_6$) δ;3.89 (s, 3H of methoxy group), 4.35 (s, 2H of methylene group), 7.72 (d, 1H of HC= ethylene group), 6.97 (d, 1H of HC=CO-), 7.55-8.08 (m, 5H of Ar-H), 6.84-7.37 (m, 4H of Ar-H), 7.58-8.77 (m, 4H of Ar-H). $^{13}$C NMR (500 MHz, DMSO-$d_6$) δ; 39.8 (1Cof methylene group), 56.7 (1C of methoxy group), 133.9, 133.9, 165.7, 166.8, (4C of imidazothiazole),119.8 (1C of HC= ethylene group), 122.3 (1C of =CH bonded with carbonyl group), 189 (C=O bonded with alkene), 115.8, 118.2, 126.9, 127.3, 128.4, 129.4, 136.9, 154.1, 165.68 (9C of coumarin) 114.3, 114.3, 130, 130, 137.5, 159.8 (6C of benzene ring), 118.7, 120.4, 129.8, 129.8, 139.7, 139.9 (6C of benzene ring).EIS-MS: m/z 564.57 (M+), 565.57 (M + 1), Anal. calculation for$C_{30}H_{20}N_4O_6S$; (564.57), calculated; C-68.32%, H-3.57%, N-9.92%, O-17.00%, S-5.68% Found; C-68.27%, H-3.54%, N-9.90%, O-16.97%, S-5.66%.

**(6j-$RT_{10}$)3-(5-(3-(4-chlorophenyl)-3-oxoprop-1-en-1-yl)-2-(4-methoxybenzyl) imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one.**

The structure of the compounds $RT_{10}$(m.p.270-273ºC, Yield; 70.85%) was confirmed by $^1$H NMR, $^{13}$C NMR and LCMS analysis; IR (KBr, cm$^{-1}$): ν= 3029, 2157, 1720, 1670, 1652, 1570, 1237, 1149, 749. $^1$H NMR (500 MHz, DMSO-$d_6$) δ;3.93 (s, 3H of methoxy group), 4.31 (s, 2H of methylene group), 7.89 (d, 1H of HC= ethylene group), 7.16 (d, 1H of HC=CO-), 7.46-8.31 (m, 5H of Ar-H), 7.48-7.80 (m, 4H of Ar-H), 6.82-7.14 (m, 4H of Ar-H). $^{13}$C NMR (500 MHz, DMSO-$d_6$) δ; 39.77 (1Cof methylene group), 56.2 (1C of methoxy group), 133.7, 133.7, 166.1, 167.7 (4C of imidazothiazole),120.5 (1C of HC= ethylene group), 124.1 (1C of =CH bonded with carbonyl group), 188.9 (C=O bonded with alkene), 115.8, 118.1, 126.7, 127.1, 128.2, 129.2, 136.7, 154.3, 165.8 (9C of coumarin) 114.3, 114.3, 130, 130, 137.5, 159.8 (6C of benzene ring), 128.9, 128.9, 132.6, 132.6, 134.7, 136.6 (6C of benzene ring). EIS-MS: m/z 553.09 (M+), 554.09 (M + 1), Anal. calculated for $C_{30}H_{20}ClN_3O_4S$; (553.09), calculated; C-65.04%, H-3.64%,Cl-6.40%, N-7.58%, O- 11.55%, S-5.79%. Found; C-65.00%, H-3.61%,Cl-6.38%, N-7.55%, O-11.52%, S-5.77%.

**Preparation of various imidazothiazole-pyrimidine derivatives ($BT_1$ to $BT_{10}$)**

In 250 mL RBF (round bottom flask) equimolar

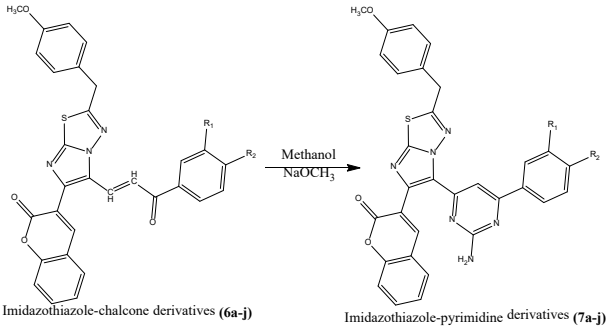
**Table-1 Physical data of synthesized imidazothiazole-chalcone derivatives**

| No | Sample | Name | Substituent | | Molecular Formula | M.P.(°C) | Yield (%) |
|---|---|---|---|---|---|---|---|
| | | | $R_1$ | $R_2$ | | | |
| 1 | 6a | $RT_1$ | -H | -H | $C_{30}H_{21}N_3O_6S$ | 225-227º C | 72.36% |
| 2 | 6b | $RT_2$ | $-NO_2$ | -H | $C_{30}H_{20}N_4O_6S$ | 267-268º C | 65.69% |
| 3 | 6c | $RT_3$ | -H | -OH | $C_{30}H_{21}N_3O_5S$ | 260-263º C | 53.36% |
| 4 | 6d | $RT_4$ | -OH | -H | $C_{30}H_{21}N_3O_5S$ | 238-240º C | 51.28% |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | 6e | $RT_5$ | -H | -Br | $C_{30}H_{20}BrN_3O_4S$ | 267-269º C | 66.36% |
| 6 | 6f | $RT_6$ | -H | - $OCH_3$ | $C_{31}H_{23}N_3O_5S$ | 245-247º C | 62.36% |
| 7 | 6g | $RT_7$ | -H | - $CH_3$ | $C_{31}H_{23}N_3O_4S$ | 234-233º C | 66.47% |
| 8 | 6h | $RT_8$ | - $OCH_3$ | -H | $C_{31}H_{23}N_3O_5S$ | 238-239º C | 60.25% |
| 9 | 6i | $RT_9$ | -H | -$NO_2$ | $C_{30}H_{20}N_4O_6S$ | 272-274º C | 69.87% |
| 10 | 6j | $RT_{10}$ | -H | -Cl | $C_{30}H_{20}ClN_4O_6S$ | 270-273º C | 70.85% |

mixture of previously prepared chalcone derivatives ($BT_1$ to $BT_{10}$) (0.01mole) and guanidine nitrate (0.01mole) was taken in 100 mL methanol. This mixture was stirred and heated, during heating sodium methoxide was added drop by drop into it and further refluxed for about 13-14 hours. The progress of the reaction was monitored by TLC and after the completion of reaction the mixture was cooled. Then poured into ice cold water;the solid obtained was filtered, dried and recrystallized from ethanol. (Scheme-6).

**Scheme-6; Synthesis of imidazothiazole-pyrimidine derivatives ($BT_1$ to $BT_{10}$)**




**(7a-$BT_1$)3-(5-(2-amino-6-phenylpyrimidin-4-yl)-2-(4-methoxybenzyl)imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one.**

The structure of the compound $BT_1$ (m.p.237-239ºC, Yield; 62.27%)was confirmed by $^1$H NMR, $^{13}$C NMR and LCMS analysis; IR (KBr, $cm^{-1}$): ν= 3452, 3039, 2165, 1722, 1684, 1241, 1175, 749. $^1$H NMR (500 MHz, DMSO-$d_6$) δ;3.82 (s, 3H of methoxy group), 4.19 (s, 2H of methylene group), 7.32-8.29 (m, 5H of Ar-H), 6.83-7.17 (m, 4H of Ar-H), 7.56-8.02 (m, 5H of Ar-H), 7.71 (s, 1H of Ar-H), 6.56 (s, 2H of amine group). $^{13}$C NMR (500 MHz, DMSO-$d_6$) δ; 39.6 (1Cof methylene group), 56.2 (1C of methoxy group), 133.9, 133.9, 164.7, 165.8 (4C of imidazothiazole), 115.8, 118.2, 126.9, 127.3, 128.4, 129.4, 136.9, 154.1, 165.6 (9C of coumarin) 114.8, 151.9, 157.8, 161.4 (4C of benzene ring), 127.9, 128.7, 128.3, 128.4, 128.4, 138.2 (6C of benzene ring). EIS-MS: m/z 558.15 (M+), 559.15 (M + 1), Anal. calculated for$C_{31}H_{22}N_6O_3S$; (558.15), Calculated; C-66.65%, H-3.97%, N-15.04%, O-8.59%, S-5.71% Found; C-66.62%, H-3.94%, N-15.01%, O-8.49%, S-5.68%.

**(7b-$BT_2$)3-(5-(2-amino-6-(3-nitrophenyl) pyrimidin-4-yl)-2-(4-methoxybenzyl) imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one.**

The structure of the compound $BT_2$ (m.p.287-290ºC, Yield; 66.11%)was confirmed by $^1$H NMR, $^{13}$C NMR and LCMS analysis; IR (KBr, $cm^{-1}$): ν= 3452, 3039, 2165, 1722, 1684, 1241, 1175, 749. $^1$H NMR (500 MHz, DMSO-$d_6$) δ;3.92 (s, 3H of methoxy group), 4.2 (s, 2H of methylene group), 6.92-7.27 (m, 4H of Ar-H), 7.63-8.92 (m, 4H of Ar-H), 7.32-8.5 (m, 5H of Ar-H), 7.77 (s, 1H of Ar-H), 6.93 (s, 2H of amine group). $^{13}$C NMR (500 MHz, DMSO-$d_6$) δ; 39.3 (1Cof methylene group), 56.0 (1C of methoxygroup), 133.5, 133.5, 164.7, 165.7 (4C of imidazothiazole), 115.8, 118.2, 126.9,

127.3, 128.4, 129.4, 136.9, 154.1, 165.6 (9C of coumarin) 114.4, 151.9, 158.8, 161.2 (4C of benzene ring), 127.8, 128.6, 128.4, 128.8, 128.8, 138.6 (6C of benzene ring). EIS-MS: m/z 603.13 (M+), 604.13(M + 1), Anal. calculated for$C_{31}H_{22}N_6O_3S$; (603.13), Calculated; C-61.69%, H-3.51%, N-16.24%, O-13.25%, S-5.31% Found; C-61.66%, H-3.49%, N-16.21%, O-13.24%, S-5.29%.

**(7c-BT$_3$)3-(5-(2-amino-6-(4-hydroxyphenyl) pyrimidin-4-yl)-2-(4-methoxybenzyl) imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one.**

The structure of the compound BT$_3$(m.p.271-274ºC, Yield; 52.85%) was confirmed by $^1$H NMR, $^{13}$C NMR and LCMS analysis; IR (KBr, cm$^{-1}$): ν= 3452, 3039, 2165, 1722, 1684, 1241, 1175, 749. $^1$H NMR (500 MHz, DMSO-$d_6$) δ;3.91 (s, 3H of methoxy group), 4.22 (s, 2H of methylene group), 6.83-7.18 (m, 4H of Ar-H), 7.65-8.93 (m, 4H of Ar-H), 7.31-8.2 (m, 5H of Ar-H), 7.76 (s, 1H of Ar-H), 6.90 (s, 2H of amine group). $^{13}$C NMR (500 MHz, DMSO-$d_6$) δ: 39.6 (1Cof methylene group), 56.1 (1C of methoxy group), 133.7, 133.7, 164.7, 165.7 (4C of imidazothiazole), 115.8, 118.2, 126.9, 127.3, 128.4, 129.4, 136.9, 154.1, 165.6 (9C of coumarin) 114.1, 151.9, 157.8, 161.1 (4C of benzene ring), 127.9, 128.5, 128.5, 129.3, 129.3, 135.8 (6C of benzene ring). EIS-MS: m/z 574.14 (M+), 575.14 (M + 1), Anal. calculated for$C_{31}H_{22}N_6O_4S$; (574.14), Calculated; C-64.80%, H-3.86%, N-14.63%, O-11.14%, S-5.58% Found; C-64.78%, H-3.84%, N-14.59%, O-11.09%, S-5.54%.

**(7d-BT$_4$)3-(5-(2-amino-6-(3-hydroxyphenyl) pyrimidin-4-yl)-2-(4-methoxybenzyl) imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one.**

The structure of the compound BT$_4$(m.p.251-253ºC, Yield; 50.02%) was confirmed by $^1$H NMR, $^{13}$C NMR and LCMS analysis; IR (KBr, cm$^{-1}$): ν = 3452, 3039, 2165, 1722, 1684, 1241, 1175, 749. $^1$H NMR (500 MHz, DMSO-$d_6$) δ;3.88 (s, 3H of methoxy group), 4.18 (s, 2H of methylene group), 6.72-7.19 (m, 4H of Ar-H), 7.66-8.93 (m, 4H of Ar-H), 7.28-8.12 (m, 5H of Ar-H), 7.69 (s, 1H of Ar-H), 6.87 (s, 2H of amine group), 9.14 (s, 1H of phenolic hydroxyl group). $^{13}$C NMR (500 MHz, DMSO-$d_6$) δ: 39.4 (1Cof methylene group), 56.0 (1C of methoxy group), 133.6, 133.6, 164.5, 165.5 (4C of imidazothiazole), 115.8, 118.2, 126.9, 127.3, 128.4, 129.4, 136.9, 154.1, 165.6 (9C of coumarin) 114.1, 151.9, 157.8, 161.1 (4C of benzene ring), 127.8, 128.4, 128.4, 128.2, 128.2, 135.9 (6C of benzene ring).. EIS-MS: m/z 574.14 (M+), 575.14 (M + 1), Anal. calculated for$C_{31}H_{22}N_6O_4S$; (574.14), Calculated; C-64.80%, H-3.86%, N-14.63%, O-11.14%, S-5.58% Found; C-64.76%, H-3.85%, N-14.60%, O-11.08%, S-5.52%.

**(7e-BT$_5$)3-(5-(2-amino-6-(4-bromophenyl) pyrimidin-4-yl)-2-(4-methoxybenzyl) imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one.**

The structure of the compound BT$_5$(m.p.280-281ºC, Yield; 64.58%) was confirmed by $^1$H NMR, $^{13}$C NMR and LCMS analysis; IR (KBr, cm$^{-1}$): ν= 3452, 3039, 2165, 1722, 1684, 1241, 1175, 749. $^1$H NMR (500 MHz, DMSO-$d_6$) δ;3.88 (s, 3H of methoxy group), 4.6 (s, 2H of methylene group), 6.92-7.26 (m, 4H of Ar-H), 7.54-7.96 (m, 4H of Ar-H), 7.31-8.2 (m, 5H of Ar-H), 8.09 (s, 1H of Ar-H), 6.84 (s, 2H of amine group). $^{13}$C NMR (500 MHz, DMSO-$d_6$) δ; 39.6 (1Cof methylene group), 56.1 (1C of methoxy group), 133.7, 133.7, 164.7, 165.7 (4C of imidazothiazole), 115.8, 118.2, 126.9, 127.3, 128.4, 129.4, 136.9, 154.1, 165.6 (9C of coumarin) 114.5, 152.9, 157.8, 162.1 (4C of benzene ring), 127.8, 128.6, 128.6, 129.4, 198.4, 138.8 (6C of benzene ring). EIS-MS: m/z 636.06 (M+), 637.06 (M + 1), Anal. calculated

for$C_{31}H_{21}N_6O_3S$; (636.06), Calculated; C-58.41%, H-3.32%, Br-12.53%, N-13.18%, O-7.53%, S-5.03% Found; C-58.38%, H-3.28%, Br-12.49%, N-13.16%, O-7.52%, S-6.99%.

**(7f-$BT_6$)3-(5-(2-amino-6-(4-methoxyphenyl) pyrimidin-4-yl)-2-(4-methoxybenzyl) imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one.**

The structure of the compound $BT_6$(m.p.267-269ºC, Yield; 61.98%) was confirmed by $^1$H NMR, $^{13}$C NMR and LCMS analysis; IR (KBr, cm$^{-1}$): ν= 3452, 3039, 2165, 1722, 1684, 1241, 1175, 749. $^1$H NMR (500 MHz, DMSO-$d_6$) δ;3.85 (s, 6H of methoxy group),4.12 (s, 2H of methylene group), 6.79-7.15 (m, 4H of Ar-H), 7.59-7.88 (m, 4H of Ar-H), 7.29-8.1 (m, 5H of Ar-H), 7.99 (s, 1H of Ar-H), 6.90 (s, 2H of amine group). $^{13}$C NMR (500 MHz, DMSO-$d_6$) δ; 39.0 (1Cof methylene group), 56.1 (2C of methoxy group), 114.3, 114.3, 130.1, 130.1, 137.5, 159.8 (6C of benzene ring), 133.8, 133.8, 164.9, 165.9 (4C of imidazothiazole), 115.8, 118.2, 126.9, 127.3, 128.4, 129.4, 136.9, 154.1, 165.6 (9C of coumarin) 94.8, 162.0, 163.6, 167.5 (4C of benzene ring), 115.4, 115.4, 128.6, 128.8, 128.8, 161.6 (6C of benzene ring). EIS-MS: m/z 588.16 (M+), 589.16 (M + 1), Anal. calculated for$C_{32}H_{24}N_6O_4S$; (588.16), Calculated; C-65.29%, H-4.11%, N-14.28%, O-10.87%, S-5.45% Found; C-65.23%, H-4.07%, N-14.20%, O-10.85%, S-5.42%.

**(7g-$BT_7$)3-(5-(2-amino-6-(p-tolyl)-pyrimidin-4-yl)-2-(4-methoxybenzyl) imidazo[2,1b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one.**

The structure of the compound $BT_7$(m.p.246-249ºC, Yield; 63.79%) was confirmed by $^1$H NMR, $^{13}$C NMR and LCMS analysis; IR (KBr, cm$^{-1}$): ν= 3452, 3039, 2165, 1722, 1684, 1241, 1175, 749. $^1$H NMR (500 MHz, DMSO-$d_6$) δ;3.82 (s, 3H of methoxy group), 4.2 (s, 2H of methylene group), 6.86-7.26 (m, 4H of Ar-H), 7.33-7.88 (m, 4H of Ar-H), 7.28-8.06 (m, 5H of Ar-H), 2.48 (s, 3H of methyl group). $^{13}$C NMR (500 MHz, DMSO-$d_6$) δ;21.2 (1C of methyl group), 39.4 (1Cof methylene group), 56.0 (1C of methoxy group), 114.5, 114.5, 131.1, 131.1, 138.4, 159.8 (6C of benzene ring), 133.9, 133.9, 165.6, 166.7 (4C of imidazothiazole), 116.8, 118.9, 127, 127.3, 128.6, 129.6, 136.9, 155.1, 165.8 (9C of coumarin) 114.5, 151.9, 157.8, 161.8 (4C of benzene ring), 129.3, 129.3, 129.8, 129.8, 138.2, 142.5 (6C of benzene ring). EIS-MS: m/z 572.16 (M+), 573.16 (M + 1), Anal. calculated for$C_{32}H_{24}N_6O_4S$; (572.16), Calculated; C-67.12%, H-4.22%, N-14.68%, O-8.38%, S-5.60% Found; C-67.10%, H-4.19%, N-14.63%, O-8.35%, S-5.50%.

**(7h-$BT_8$)3-(5-(2-amino-6-(3-methoxphenyl)-pyrimidin-4-yl)-2-(4-methoxybenzyl) imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one.**

The structure of the compound $BT_{8(}$m.p.267-269ºC, Yield; 61.98%) was confirmed by $^1$H NMR, $^{13}$C NMR and LCMS analysis; IR (KBr, cm$^{-1}$): ν= 3452, 3039, 2165, 1722, 1684, 1241, 1175, 749. $^1$H NMR (500 MHz, DMSO-$d_6$) δ;3.84 (s, 6H of methoxy group),4.19 (s, 2H of methylene group), 6.81-7.19 (m, 4H of Ar-H), 7.56-7.91 (m, 4H of Ar-H), 7.32-8.28 (m, 5H of Ar-H), 8.09 (s, 1H of Ar-H), 6.98 (s, 2H of amine group). $^{13}$C NMR (500 MHz, DMSO-$d_6$) δ; 39.3 (1Cof methylene group), 56.1 (2C of methoxy group), 114.7, 114.7, 130.6, 130.6, 137.4, 159.6 (6C of benzene ring), 133.7, 133.7, 164.7, 165.7 (4C of imidazothiazole), 115.8, 118.2, 126.9, 127.3, 128.4, 129.4, 136.9, 154.1, 165.6 (9C of coumarin) 94.8, 162.0, 163.6, 167.5 (4C of benzene ring), 114.7, 114.7, 128.3, 128.6, 128.6, 160.6 (6C of benzene ring). EIS-MS: m/z 588.16 (M+), 589.16 (M + 1), Anal. calculed for$C_{32}H_{24}N_6O_4S$; (588.16), Calculated; C-65.29%, H-4.11%, N-14.28%, O-10.87%, S-5.45% Found; C-65.23%, H-4.07%,

N-14.20%, O-10.85%, S-5.42%.

**(7i-$BT_9$)3-(5-(2-amino-6-(4-nitrophenyl) pyrimidin-4-yl)-2-(4-methoxybenzyl) imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one.**

The structure of the compound $BT_9$(m.p.282-284ºC, Yield; 67.49%) was confirmed by $^1$H NMR, $^{13}$C NMR and LCMS analysis; IR (KBr, cm$^{-1}$): ν= 3452, 3039, 2165, 1722, 1684, 1241, 1175, 749. $^1$H NMR (500 MHz, DMSO-$d_6$) δ;3.88 (s, 3H of methoxy group), 4.2 (s, 2H of methylene group), 6.83-7.18 (m, 4H of Ar-H), 7.64-8.93 (m, 4H of Ar-H), 7.28-8.2 (m, 5H of Ar-H), 7.74 (s, 1H of Ar-H), 6.89 (s, 2H of amine group). $^{13}$C NMR (500 MHz, DMSO-$d_6$) δ; 39.4 (1Cof methylene group), 56.0 (1C of methoxy group), 133.8, 133.8, 164.7, 165.7 (4C of imidazothiazole), 115.8, 118.2, 126.9, 127.3, 128.4, 129.4, 136.9, 154.1, 165.6 (9C of coumarin) 114.3, 152, 157.8, 162.1 (4C of benzene ring), 127.8, 128.3, 128.3, 128.4, 128.4, 138.1 (6C of benzene ring). EIS-MS: m/z 603.13 (M+), 604.13 (M + 1), Anal. calculated for$C_{31}H_{22}N_6O_3S$; (603.13), Calculated; C-61.69%, H-3.51%, N-16.24%, O-13.25%, S-5.31% Found; C-61.66%, H-3.49%, N-16.21%, O-13.24%, S-5.29%.

**(7j-$BT_{10}$)3-(5-(2-amino-6-(4-chlorophenyl)-pyrimidin-4-yl)-2-(4-methoxybenzyl) imidazo[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one.**

The structure of the compound $BT_{10}$(m.p.279-280ºC, Yield; 68.14%) was confirmed by $^1$H NMR, $^{13}$C NMR and LCMS analysis; IR (KBr, cm$^{-1}$): ν= 3452, 3039, 2165, 1722, 1684, 1241, 1175, 749. $^1$H NMR (500 MHz, DMSO-$d_6$) δ;3.94 (s, 3H of methoxy group), 4.2 (s, 2H of methylene group), 6.92-7.34 (m, 4H of Ar-H), 7.63-7.99 (m, 4H of Ar-H), 7.28-8.2 (m, 5H of Ar-H), 8.01 (s, 1H of Ar-H), 6.86 (s, 2H of amine group). $^{13}$C NMR (500 MHz, DMSO-$d_6$) δ; 39.8 (1Cof methylene group), 56.2 (1C of methoxy group), 133.8, 133.8, 165.2, 166.6 (4C of imidazothiazole), 115.8, 118.2, 126.9, 127.3, 128.4, 129.4, 136.9, 154.1, 165.6 (9C of coumarin) 114.6, 152.9, 158.6, 163.1 (4C of benzene ring), 128.7, 129.3, 129.3, 130.4, 130.4, 138.4 (6C of benzene ring). EIS-MS: m/z 592.11 (M+), 6593.11 (M + 1), Anal. calculated for$C_{31}H_{21}ClN_6O_3S$; (592.11), Calculated; C-62.78%, H-3.57%, Cl-5.98%, N-14.17%, O-8.09%, S-5.41% Found; C-62.74%, H-3.53%, Cl-5.91%, N-14.11%, O-8.02%, S-5.38.

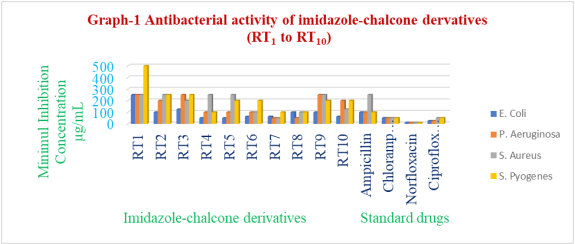
**Table-7 Antimalarial activity of imidazothiazole-chalcone derivatives. ($RT_1$ to $RT_{10}$)**

**Table-2 Physical data of synthesized imidazothiazole-pyrimidine derivatives**

| No | Sample | Name | Substituent | | Molecular Formula | M.P.(°C) | Yield (%) |
|---|---|---|---|---|---|---|---|
| | | | $R_1$ | $R_2$ | | | |
| 1 | 7a | $BT_1$ | -H | -H | $C_{31}H_{22}N_6O_3S$ | 237-239º C | 62.27% |
| 2 | 7b | $BT_2$ | -$NO_2$ | -H | $C_{31}H_{21}N_7O_5S$ | 287-290º C | 66.11% |
| 3 | 7c | $BT_3$ | -H | -OH | $C_{31}H_{22}N_6O_4S$ | 271-274º C | 52.85% |
| 4 | 7d | $BT_4$ | -OH | -H | $C_{31}H_{22}N_6O_4S$ | 251-253º C | 50.02% |
| 5 | 7e | $BT_5$ | -H | -Br | $C_{31}H_{21}BrN_6O_3S$ | 280-281º C | 64.58% |
| 6 | 7f | $BT_6$ | -H | - $OCH_3$ | $C_{32}H_{24}N_6O_4S$ | 267-269º C | 61.98% |
| 7 | 7g | $BT_7$ | -H | -$CH_3$ | $C_{32}H_{24}N_6O_3S$ | 246-249º C | 63.79% |
| 8 | 7h | $BT_8$ | - $OCH_3$ | -H | $C_{31}H_{23}N_3O_5S$ | 249-250º C | 58.28% |
| 9 | 7i | $BT_9$ | -H | -$NO_2$ | $C_{31}H_{21}N_7O_5S$ | 282-284º C | 67.49% |
| 10 | 7j | $BT_{10}$ | -H | -Cl | $C_{31}H_{21}ClN_6O_3S$ | 279-280º C | 68.14% |

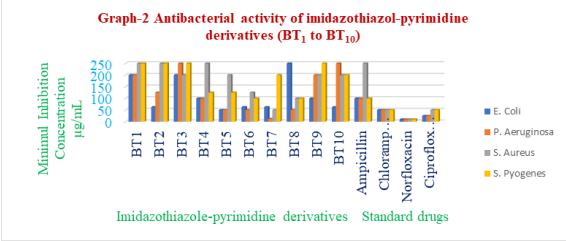
## Table-3 Antibacterial activity of imidazothiazole-chalcone derivatives. ($RT_1$ to $RT_{10}$)

| Antibacterial activity | | | | | |
|---|---|---|---|---|---|
| Minimal Inhibition Concentration | | | | | |
| Sr. No. | Code No. | *E. Coli* MTCC443 | *P. Aeruginosa* MTCC1688 | *S. Aureus* MTCC96 | *S. Pyogenes* MTCC442 |
| 6a | $RT_1$ | 250 | 250 | 250 | 500 |
| 6b | $RT_2$ | 100 | 200 | 250 | 250 |
| 6c | $RT_3$ | 125 | 250 | 200 | 250 |
| 6d | $RT_4$ | 50 | 100 | 250 | 100 |
| 6e | $RT_5$ | 50 | 100 | 250 | 200 |
| 6f | $RT_6$ | 62.5 | 100 | 100 | 200 |
| 6g | $RT_7$ | 62.5 | 50 | 50 | 100 |
| 6h | $RT_8$ | 100 | 50 | 100 | 100 |
| 6i | $RT_9$ | 100 | 250 | 250 | 200 |
| 6j | $RT_{10}$ | 62.5 | 200 | 125 | 200 |
| Ampicillin | | 100 | 100 | 250 | 100 |
| Chloramphenicol | | 50 | 50 | 50 | 50 |
| Norfloxacin | | 10 | 10 | 10 | 10 |
| Ciprofloxacin | | 25 | 25 | 50 | 50 |



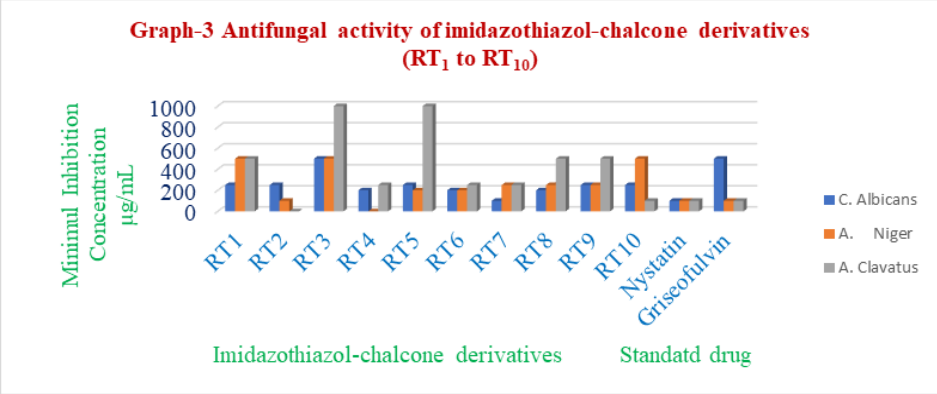

## Table-4 Antibacterial activity of imidazothiazole-pyrimidine derivatives. ($BT_1$ to $BT_{10}$)

| Antibacterial activity | | | | | |
|---|---|---|---|---|---|
| Minimal Inhibition Concentration | | | | | |
| Sr. No. | Code No. | *E. Coli* MTCC443 | *P. Aeruginosa* MTCC1688 | *S. Aureus* MTCC96 | *S. Pyogenes* MTCC442 |
| 7a | $BT_1$ | 200 | 200 | 250 | 250 |
| 7b | $BT_2$ | 62.5 | 125 | 250 | 250 |
| 7c | $BT_3$ | 200 | 250 | 200 | 250 |
| 7d | $BT_4$ | 100 | 100 | 250 | 125 |
| 7e | $BT_5$ | 50 | 50 | 200 | 125 |
| 7f | $BT_6$ | 62.5 | 50 | 125 | 100 |
| 7g | $BT_7$ | 62.5 | 12.5 | 50 | 200 |
| 7h | $BT_8$ | 250 | 50 | 100 | 100 |
| 7i | $BT_9$ | 100 | 200 | 200 | 250 |
| 7j | $BT_{10}$ | 62.5 | 250 | 200 | 200 |
| Ampicillin | | 100 | 100 | 250 | 100 |
| Chloramphenicol | | 50 | 50 | 50 | 50 |
| Norfloxacin | | 10 | 10 | 10 | 10 |
| Ciprofloxacin | | 25 | 25 | 50 | 50 |



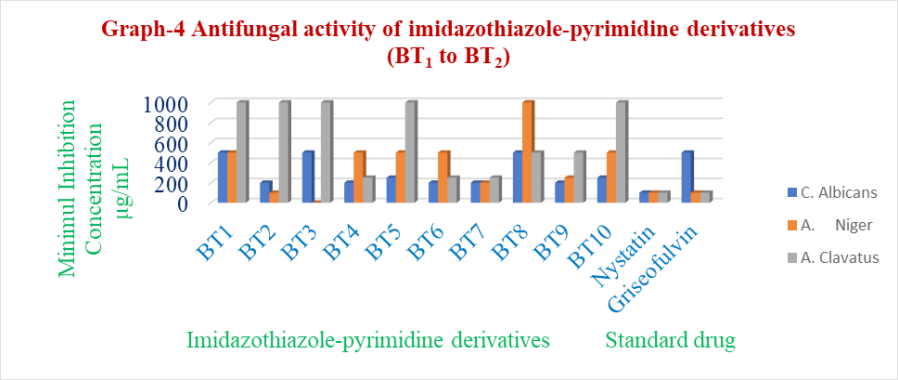
## Table-5 Antifungal activity and antitubercular activity of imidazothiazole-chalcone derivatives. ($RT_1$ to $RT_{10}$)

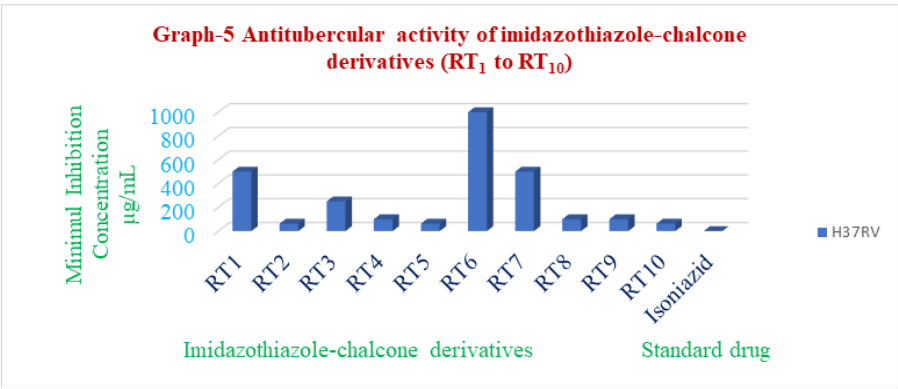
| Antifungal activity and antitubercular activity | | | | | |
|---|---|---|---|---|---|
| Minimal Inhibition Concentration | | | | | |
| Sr. No. | Code No. | *C. Albicans* MTCC227 | A. *Niger* MTCC282 | *A. Clavatus* MTcc1323 | $H_{37}RV$ MIC µg/mL |
| 6a | $RT_1$ | 250 | 500 | 500 | 500 |
| 6b | $RT_2$ | 250 | 100 | >1000 | 62.5 |
| 6c | $RT_3$ | 500 | 500 | 1000 | 250 |
| 6d | $RT_4$ | 200 | >1000 | 250 | 100 |
| 6e | $RT_5$ | 250 | 200 | 1000 | 62.5 |
| 6f | $RT_6$ | 200 | 200 | 250 | 1000 |
| 6g | $RT_7$ | 100 | 250 | 250 | 500 |
| 6h | $RT_8$ | 200 | 250 | 500 | 100 |
| 6i | $RT_9$ | 250 | 250 | 500 | 100 |
| 6j | $RT_{10}$ | 250 | 500 | 100 | 62.5 |
| Nystatin | | 100 | 100 | 100 | - |
| Griseofulvin | | 500 | 100 | 100 | - |
| Rifampicin | | - | - | - | 40 |
| Isoniazid | | - | - | - | 0.2 |

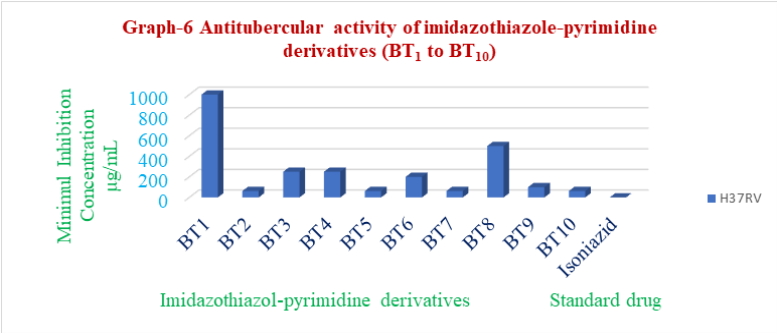



## Table-6 Antifungal activity and antitubercular activity of imidazothiazole-pyrimidine derivatives. ($BT_1$ to $BT_{10}$)

| Antifungal activity and antitubercular activity | | | | | |
|---|---|---|---|---|---|
| Minimal Inhibition Concentration | | | | | |
| Sr. No. | Code No. | *C. Albicans* MTCC227 | A. *Niger* MTCC282 | *A. Clavatus* MTcc1323 | $H_{37}RV$ MIC µg/mL |
| 7a | $BT_1$ | 500 | 500 | 1000 | 1000 |
| 7b | $BT_2$ | 200 | 100 | 1000 | 62.5 |
| 7c | $BT_3$ | 500 | >1000 | 1000 | 250 |
| 7d | $BT_4$ | 200 | 500 | 250 | 250 |
| 7e | $BT_5$ | 250 | 500 | 1000 | 62.5 |
| 7f | $BT_6$ | 200 | 500 | 250 | 200 |
| 7g | $BT_7$ | 200 | 200 | 250 | 62.5 |
| 7h | $BT_8$ | 500 | 1000 | 500 | 500 |
| 7i | $BT_9$ | 200 | 250 | 500 | 100 |
| 7j | $BT_{10}$ | 250 | 500 | 1000 | 62.5 |
| Nystatin | | 100 | 100 | 100 | - |
| Griseofulvin | | 500 | 100 | 100 | - |
| Rifampicin | | - | - | - | 40 |
| Isoniazid | | - | - | - | 0.2 |




| Antimalarial activity | | |
|---|---|---|
| Minimal Inhibition Concentration | | |
| Sr. No. | Code No. | Mean Values |
| 6a | $RT_1$ | 1.25µg/mL |
| 6b | $RT_2$ | 0.52 µg/mL |
| 6c | $RT_3$ | 1.01 µg/mL |
| 6d | $RT_4$ | 0.25 µg/mL |
| 6e | $RT_5$ | 0.36 µg/mL |
| 6f | $RT_6$ | 0.78 µg/mL |
| 6g | $RT_7$ | 0.65 µg/mL |
| 6h | $RT_8$ | 0.88 µg/mL |
| 6i | $RT_9$ | 0.62 µg/mL |
| 6j | $RT_{10}$ | 0.24 µg/mL |
| Chloroquine | | 0.020 µg/mL |
| Quinine | | 0.268 µg/mL |

**Table-8 Antimalarial activity of imidazothiazole-pyrimidine derivatives. ($BT_1$ to $BT_{10}$)**

| Antimalarial activity | | |
|---|---|---|
| Minimal Inhibition Concentration | | |
| Sr. No. | Code No. | Mean Values |
| 7a | $BT_1$ | 1.62µg/mL |
| 7b | $BT_2$ | 0.51 µg/mL |
| 7c | $BT_3$ | 2.35 µg/mL |
| 7d | $BT_4$ | 0.24 µg/mL |
| 7e | $BT_5$ | 0.36 µg/mL |
| 7f | $BT_6$ | 0.55 µg/mL |
| 7g | $BT_7$ | 0.69 µg/mL |
| 7h | $BT_8$ | 0.70 µg/mL |
| 7i | $BT_9$ | 0.53 µg/mL |
| 7j | $BT_{10}$ | 0.22 µg/mL |
| Chloroquine | | 0.020 µg/mL |
| Quinine | | 0.268 µg/mL |

## Results and discussion

5-(4-methoxybenzyl)-1,3,4-thiazol-2-amine **(1)** was synthesized by reaction between *p*-methoxy

phenylacetic acid and thiosemicarbazide in ethanol as solvent in the presence of concentrate $H_2SO_4$ as catalyst. The synthesis can be carried out without using solvent like ethanol. Mixture of *p*-methoxy phenylacetic acid and thiosemicarbazide were taken into $POCl_3$ and heated for 45 minutes in RBF and followed by addition of cold distilled water and further heated for 4 hours. Hot solution was filtered and addition of aqueous solution of potassium hydroxide gave compound-1. The thiadiazol was confirmed by δ 5.7 of 2H (s, primary amine), 3.83 (s, 3H, $OCH_3$), 4.15 (s, 2H, $CH_2$).

3-acetyl-2*H*-chromen-2-one **(2)** was synthesized by reaction between salicylaldehyde and ethyl acetoacetate in methanol solvent and dimethylaniline as the catalyst. 3-acetyl-2*H*-chromen-2-one **(2)** was confirmed by 1720 $cm^{-1}$ IR value of C=O group and δ 8.32 (s, 1H, 4$^{th}$ position), 7.60 (m, 2H, 5$^{th}$ and 8$^{th}$ position), 7.37 (m, 2H, 6$^{th}$ and 7$^{th}$ position), 2.75 (s, $COCH_3$) in $^1$H NMR.

3-acetyl-2*H*-chromen-2-one **(2)**was brominated to yield 3-(2-bromoacetyl)-2*H*-chromen-2-one **(3)**using chloroform solvent and heating in water bath for 20 minutes; the structure **(3)** was confirmed; δ 8.41 (s, 1H, 4$^{th}$ position), 7.65 (m, 2H, 5$^{th}$ and 8$^{th}$ position), 7.38 (m, 2H, 6$^{th}$ and 7$^{th}$ position), 4.43 (s, $COCH_2Br$) in $^1$H NMR.

3-(2-(4-methoxybenzyl)-imidazole[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one **(4)** was synthesized by cyclization between 5-(4-methoxybenzyl)-1,3,4-thiazol-2-amine (1) and 3-(2-bromoacetyl)-2*H*-chromen-2-one **(3)** in ethanol using reflux condition. Compound 3-(2-(4-methoxybenzyl)-imidazole[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one **(4)** was confirmed; δ 3.8 (s, 3H, $OCH_3$), 4.15 (s, 2H, $CH_2$), 6.90-7.30 (m, 4H, Ar-H), 8.43 (s, 1H, 4$^{th}$ position), 7.66 (m, 2H, 5$^{th}$ and 8$^{th}$ position), 7.39 (m, 2H, 6$^{th}$ and 7$^{th}$ position), 7.14 (s, 1H, imidazole) in $^1$H NMR.

2-(4-methoxybenzyl)-6-(2-oxo-2*H*-chromen-3-yl)imidazo[2,1b][1,3,4]thiadiazole-5-carbaldehy- de **(5)** was obtained by Vilsmeier reaction with the corresponding 3-(2-(4-methoxybenzyl)-imidazole[2,1-b][1,3,4]thiadiazol-6-yl)-2*H*-chromen-2-one **(4)** [32]. This carbaldehyde derivative was confirmed IR data 1680 $cm^{-1}$ and δ 9.74 of 1H corresponding aldehyde group.

The series of imidazothiazole-chalcone derivatives **6a-j** (shown in Table-1) was prepared by Claisen-Schmidt condensation of the appropriate substituted acetophenone by treating them with 2-(4-methoxybenzyl)-6-(2-oxo-2*H*-chromen-3-yl)imidazo[2,1-b][1,3,4]thiadiazole-5-carbaldehyde **(5)** in the presence of 20% sodium hydroxide solution [33]. Unreacted carbaldehyde **(5)** and/or acetophenone was removed by using ethyl acetate and n-hexane.

First the imidazothiazole-chalcone derivative was dissolved into minimum ethyl acetate and kept inside water-bath and n-hexane was added drop by drop to obtain crystalline product. Imidazothiazole-chalcone **(6a-j)** were confirmed by IR data and $^1$H NMR data, 1720 $cm^{-1}$ of carbonyl of coumarin and 1670 $cm^{-1}$ of α, β-unsaturated carbonyl group and δ 3.74 (s, 3H of methoxy group), 4.15 (s, 2H of methylene group), 7.67 (d, 1H of HC= ethylene group), 6.76 (d, 1H of HC=CO group).

The series of imidazothiazole-pyrimidine derivatives **7a-j** (shown in Table-2) were prepared by cyclization reaction between imidazothiazole-chalcone derivatives **6a-j** and guanidine nitrate. This reaction was possible by the two way such as (i) sodium hydroxide aqueous solution and sodium methoxide by using ethanol/methanol solvent. It was found that in sodium hydroxide aqueous solution the final product was sticky; (ii) while in methanol/ sodium methoxide the reaction product was

finely powered form. This method was better as it gave good yield and reaction time was lesser.

These imidazothiazole-pyrimidine derivatives were confirmed by IR data and $^1$H NMR data such as 3352 $cm^{-1}$ and 3225 $cm^{-1}$ two band of primary amines and δ 3.73singlet of 3H of methoxy group, δ 4.1 singlet of 2H of methylene group, δ 6.82-7.15 multiple of 4H of Ar-H, δ 7.64-8.92 multiple of 4H of Ar-H, δ 7.30-8.1 multiple of 5H of Ar-H(coumarin), δ 7.72 singlet of 1H of Ar-H and δ 6.89 singlet 2H of amine group.

**Biological activityAntibacterial activity:**

The minimum inhibition concentration is of the imidazothiazole-chalcone derivatives **(6a-j)** and imidazothiazole-pyrimidine derivatives **(7a-j)** shown in Table-3 (Graph-1) and Table-4 (Graph-2) respectively. Most of the compounds tested, exhibited considerable activities against *E. Coli, P. Aeruginosa, S. Aureus*, *S. Pyogenes.* According to data of antibacterial activity chalcone derivative such as **$RT_6$**(4-$OCH_3$), **$RT_7$**(4-$CH_3$) and **$RT_{10}$**(4-Cl) exhibited very good activity at **62.5 µg/mL** and pyrimidine derivative such as **$BT_2$**(2-$NO_2$),**$BT_6$**(4-$OCH_3$), **$BT_7$**(4-$CH_3$) and **$BT_{10}$**(4-Cl) exhibited very good activity at **62.5 µg/mL**against *E. Coli*as compared to Ampicillin (MIC=100µg/mL). Chalcone derivative such as **$RT_7$**(4-$CH_3$) and **$RT_8$**(4-$OCH_3$) exhibited very good activity at **50 µg/mL** and pyrimidine derivative such as **$BT_5$**(4-Br),**$BT_6$**(4-$OCH_3$) and**$BT_8$**(2-$OCH_3$) exhibited very good activity at **50 µg/mL**against *P. Aeruginosa*as compared to Ampicillin (MIC=100µg/mL) and equal as Chloramphenicol (MIC=50µg/mL).

Chalcone derivative such as **$RT_7$**(4-$CH_3$) exhibited very good activity at **50 µg/mL; $RT_6$** (4-$OCH_3$)exhibited very good activity at **100 µg/mL;$RT_{10}$**(4-$OCH_3$)exhibited very good activity at **125 µg/mL;** and pyrimidine derivative such as **$BT_7$**(4-$CH_3$) exhibited very good activity at **50 µg/mL;$BT_8$**(2-$OCH_3$) exhibited very good activity at **100 µg/mL**against *S. Aureus*as compared to Ampicillin (MIC=250µg/mL) and chalcone derivative such as **$RT_7$**(4-$CH_3$)exhibited very good activity at **50 µg/mL** and pyrimidine derivative such as **$BT_7$**(4-$CH_3$) exhibited very good activity at **50 µg/mL** equal as Chloramphenicol (MIC=50µg/mL). Chalcone derivative such as **$RT_4$**(2-OH), **$RT_7$**(4-$CH_3$) and **$RT_8$**(4-$OCH_3$)exhibited very good activity at **100 µg/mL** against *S. Pyrogens* as compared to Ampicillin (MIC=100µg/mL) and pyrimidine derivative such as **$BT_6$**(4-$OCH_3$) and**$BT_8$**(2-$OCH_3$)exhibited very good activity at **100 µg/mL** against *S. Pyrogens* as compared to Ampicillin (MIC=100µg/mL).

**Antibacterial activity:**

The minimum inhibition concentration of the imidazothiazole-chalcone derivatives **(6a-j)** and imidazothiazole-pyrimidine derivatives **(7a-j)** are shown in Table-5(Graph-3) and Table-6 (Graph-4) respectively.Most of the compounds tested, exhibited considerable activities against *C. Albicans, A. Niger* and *A. Clavatus*. According to data of antifungal activity chalcone derivative such as **$RT_7$**(4-$CH_3$) exhibited very good activity at **100 µg/mL***C. Albicans* as compared Nystatin (MIC=100µg/mL).

Chalcone derivative such as **$RT_2$**(2-$NO_2$), exhibited very good activity at **100 µg/mL**against *A. Niger* as compared to Nystatin (MIC=100µg/mL) and pyrimidine derivative such as **$BT_2$**(2-$NO_2$)exhibited very good activity at **100 µg/mL** against *A. Niger* as compared to Nystatin (MIC=100µg/mL). Chalcone derivative such as **$RT_{10}$**(2-Cl), exhibited very good activity at **100 µg/mL** against *A.Clavatus*as compared to Nystatin (MIC=100µg/mL). While other chalcone and pyrimidine derivatives which were tested, showed less activity.

**Antitubercular activity:**

The encouraging results of antibacterial activity study of imidazothiazole-chalcone derivatives **(6a-j)** and imidazothiazole-pyrimidine derivatives **(7a-j)** impelled to carry out further preliminary screening against *M. tuberculosis*. The results of antitubercular activity of imidazothiazole-chalcone derivatives **(6a-j)** and imidazothiazole-pyrimidine derivatives **(7a-j)** shown in Table-5 (Graph-5) and Table-6 (Graph-6) respectively. In the screening tests of these compounds 1000, 500 and 250 µg/mL concentration were taken. Among these compounds which showed activity in the screening were further used for the testing for secondary screening against *M. tuberculosis*$H_{37}$RV in the L. J. Medium (conventional method).

The data of the antitubercular activity was compared with Rifampicin at a 40 µg/mL concentration. Imidazothiazole-Chalcone derivatives **(6a-j)** such as **$RT_2$**, **$RT_5$** and **$RT_{10}$** and imidazothiazole-pyrimidine derivatives **(7a-j)** such as **$BT_2$**, **$BT_5$** and **$BT_{10}$**containing nitro, bromo and chloro substituted showed *M. tuberculosis*MIC values in the range between **62.5 µg/mL** which indicated 95-99% better results. While remaining derivatives showed moderate to weak activity against *M. tuberculosis*$H_{37}$RV.

**Antimalarial activity:**

Antimalarial activity of imidazothiazole-chalcone derivatives **(6a-j)** and imidazothiazole-pyrimidine derivatives **(7a-j)** shown in Table-7 and Table-8 respectively. Antimalarial activity compared with standard drug such as Chloroquine and Quinine. The minimum inhibition concentration are 0.020 µg/mL and 0.268 µg/mL respectively. Chalcone derivatives such as **$RT_4$**(4-OH)and **$RT_{10}$**(4-Cl) exhibited very good activity at **0.25 µg/mL** and **0.24 µg/mL**as antimalarial compared to Quinine (MIC=0.268 µg/mL). Pyrimidine derivatives such as **$BT_4$**(4-OH)and **$BT_{10}$**(4-Cl) exhibited very good activity at **0.24 µg/mL** and **0.22 µg/mL**as antimalarial compared to Quinine (MIC=0.268 µg/mL).

**Conclusion**

Imidazothiazole-chalcone derivatives **$RT_6$**, **$RT_7$** and **$RT_{10}$** and imidazothiazole-pyrimidine derivatives **$BT_2$**, **$BT_6$**, **$BT_7$** and **$BT_{10}$** are possessed excellent antibacterial activity as compared to Ampicillin. Compounds bearing methyl, methoxy and halogen were to and more effective to inhibit the bacterial growth. imidazothiazole-chalcone derivatives and pyrimidine derivatives containing nitro and halogen group showed **62.5 µg/mL** values comparable with Rifampicin. The chalcone and pyrimidine derivatives having hydroxyl and chloro substituted group showed better antimalarial activity. From results, we can conclude that the derivatives having nitro, halogen, methoxy or methyl group can impart better effect of biological activity.

**Acknowledgements**

The authors are thankful to the Principal of Navyug Science College, Dr. Ashwin S. Patel, for providing necessary facilities, SAIF for spectral analysis.

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