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DESIGN,SYNTHESIS AND STRUCTURAL ELUCIDATION OF SOME NOVEL HETEROCYCLIC MOLECULES DERIVED FROM THIENO [2, 3-*D*] PYRIMIDINE NUCLEUS

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ABSTRACT
Several new thieno[2,3-*d*]Pyrimidine derivatives 3-Substituted phenyl-5-(thiophen-2-yl)thieno[3,2-e][1,2,4]triazolo[4,3-c]pyrimidine 6(a-j), were synthesized starting from thieno[2,3-*d*]pyrimidine-2,4-diol (1). The characterization of the newly synthesized compounds was Established by IR, ^{1}H NMR, ^{13}C NMR and Mass Spectral analysis.

Key words: Thieno [2, 3-*d*] Pyrimidine, Biological significance Cyclisation.

INTRODUCTION:

Pyrimidine has always been a unique interesting Heterocyclic moiety for the medicinal chemists; an exhaustive research has been done on the pyrimidines that led to the discovery and introduction of several drugs into the market. From the standpoint of Biological activity, fused hetero aromatic systems are often of much greater interest than the constituent monocyclic compounds. The appearance of qualitatively new properties of an annulated molecule, enlargement of the possibility of varying pharmacophore groups in different positions of the molecule and the ability of the latter to interact with a wider spectrum of receptors adopting various conformations are apparently of crucial importance. In addition, the structure of the molecule can be varied by annealing at different positions of individual Heterocyclic fragments.

Fused Pyrimidines have also been attracted a considerable interest in medicinal chemistry research due to their versatility and a broad bioactive potential. Thieno pyrimidine is among those fused pyrimidines found to have a wide variety of pharmacological and biological applications. Since last four decades research has been focused on the design and synthesis of novel thieno pyrimidines as medicinal

agents, a large number of reports have been documented on thieno pyrimidines as they found to exhibit a variety of biological activities such as antimicrobial, anti-inflammatory, bronchodilatory activity, inhibition of Phospo diesterases, tyrosine kinase and VEGFR

kinase. It is evident that purine as an endogeneous scaffold plays an important biochemical role in variety of regular physiological functions such as respiration, inflammation, cell proliferation and so forth. As a bio isoster to Purines, thieno[2,3-d] pyrimidines were also found to exhibit numerous biological activities probably due to the interaction with various physiological elements.

Thieno Pyrimidine is a bi cyclic heterocyclic compound consists of a five membered thiophene ring is fused to a six membered hetero cylic ring with two nitrogen atoms. The fusion may occur in three different orientations that results in three important types of thieno pyrimidines namely; **Thieno[2,3-*d*]Pyrimidine (a)**, thieno[3,2-*d*]Pyrimidine (b) and thieno[3,4-*d*]pyrimidine (c). Most of the isomeric thienopyrimidines occur as colored amorphous form, some exists as crystalline form.

Synthetic approaches for the construction of a number of thieno Pyrimidines are well established. There exists three possible types of fusion of thiophene to pyrimidines ring results in corresponding isomeric thienopyrimidines namely; thieno [2,3-*d*]pyrimidines (a), thieno[3,4-*d*] pyrimidines (b) and thieno[3,2-*d*] pyrimidines (c).

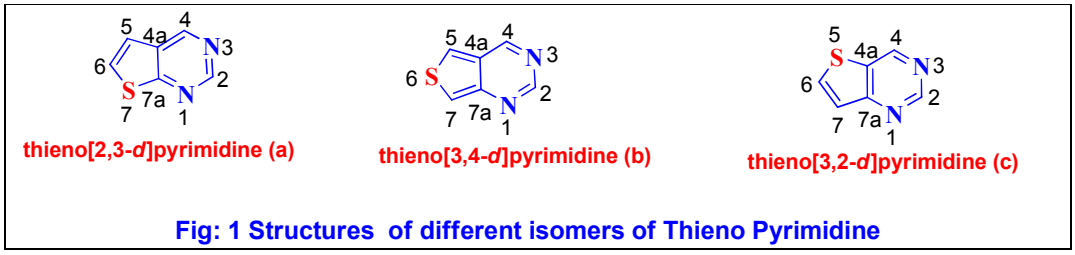


Fig: 1 Structures of different isomers of Thieno Pyrimidine

Heterocycles containing the Thieno Pyrimidine moiety (**Figure 1**) are of interest because of their interesting pharmacological and biological activities [**I–VI**]. Thus, over the last two decades many thieno Pyrimidines have been found to exhibit a variety of pronounced activities, for example, as anti-inflammatory **[III,VII]**, anti-microbial [**III,VIII**], antiviral [**IX**] and analgesic [**X**] agents. Some Thieno Pyrimidine derivatives showed good antitumor activity [**XI**].

As a logical consequence of thiophene – phenyl isosterism,similarly thieno pyrimidines can be considered as bio isosteres of quinazolines, which are extensively described in scientific and patent literature as displaying a plethora of biological activities. The synthesis of thieno pyrimidine derivatives as potential surrogates for the quinazoline core structure has therefore, become a routine strategy in modern drug design and development. Thieno pyrimidines as isosteres of quinazolines are shown here.

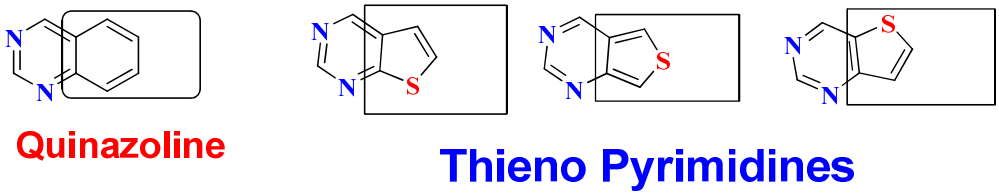


Fig: 2 Structures of thiophene – phenyl isosterism in Quinazolines and Thieno Pyrimidi

Thienopyrimidines can also be considered as structural analogues of five-membered heterocycles such as purines and thiazolopyrimidines. As interesting anti-HIV activity was

discovered within the thiazolo[5,4-d]pyrimidine series, whereas the thiazolo[4,5d]pyrimidines lack antiretroviral activity. The structures of purines and thiazolo pyrimidines are shown in the following **figure 3**.

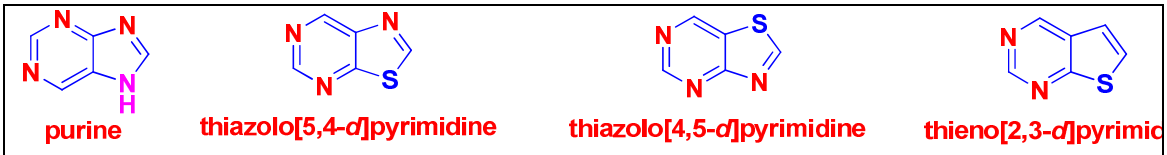


figure3.Structures of purines and thiazolo pyrimidines

Encouraged by the diverse biological activities of Thieno [2,3-*d*]pyrimidine Heterocyclic compounds, it was decided to prepare a new series of Thieno[2,3-*d*]pyrimidine Heterocyclic compounds. Literature survey revealed that incorporation of different groups in Thieno[2,3-*d*]pyrimidine Heterocyclic ring enhanced antibacterial and antifungal activity. In the present communication 2-chloro-4-hydrazinyl thieno[2,3-*d*] pyrimidine (4) was reacted with different substituted acids (5a-j) in $POCl_3$ at Reflux Temperature to form 1,2,4 tri azole Thieno Pyrimidine derivatives 6 (a-j), The synthesis of the compounds as per the following Scheme **I** given below.

The synthetic route was depicted in scheme **I.**

The structures of all synthesized compounds were assigned on the basis of IR, Mass, ^{1}H & ^{13}C NMR spectral data analysis. Further these compounds were subjected for antifungal and antibacterial activity.

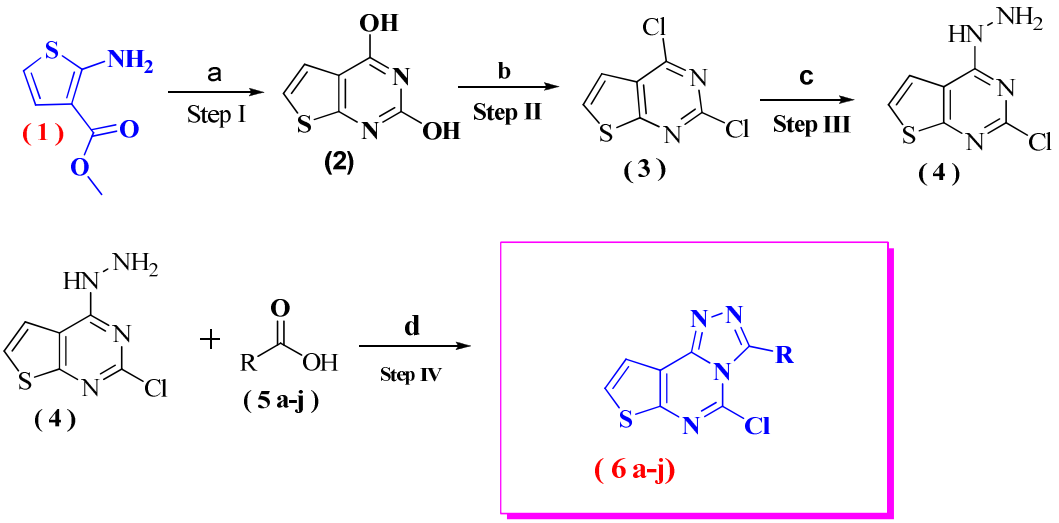
MATERIALS AND METHODS

In this Investigation chemicals were purchased from local dealer with S.D fine make was used. Chemicals were 99 % pure; purity has been checked by thin layer chromatography and melting point. Conventional method has been used for synthesis of thieno [2,3-d]pyrimidine derivatives. Stirring and reflux method were used for synthesis of thieno[2,3-d]pyrimidine derivatives 8 (a-j) respectively.

The synthetic route was depicted in scheme **I.**

The title compounds 6(a-j) were synthesized in five sequential steps using different reagents and reaction conditions, the 6(a-j) were obtained in moderate yields. The structure were established by spectral (IR, ^{1}H-NMR, ^{13}C-NMR and mass) and analytical data.

Synthetic Scheme



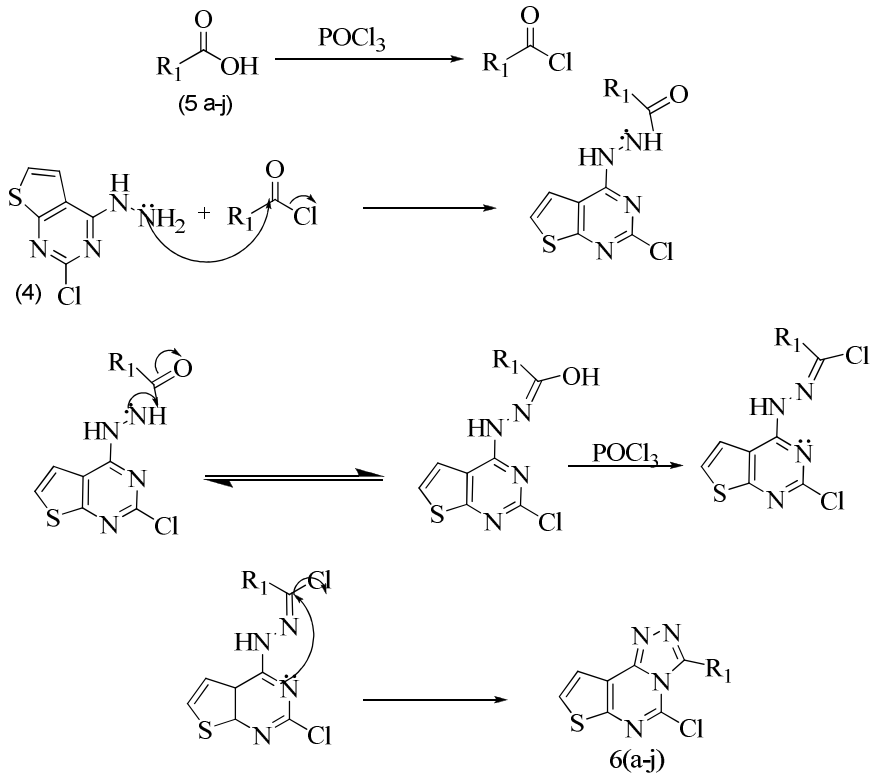
R = -Phenyl, -4 Methyl phenyl, -4 Methoxy phenyl, -4 tri fluoro methoxy phenyl, -4 Tri fluoro phenyl, -4 Chloro phenyl, -4 Bromo phenyl, -4 Nitro phenyl, -2 Indole, iso nicotinic acids

Scheme 1: Synthetic path way for compounds **8a-8j**.

Scheme 1: Synthetic path way of preparation of 1,2,4-triazole thienopyrimidine derivatives.

Reagents and Reaction conditions: (a) Urea, 200^{O}C, 3 hrs (b) $POCl_3$, N-ethyl - N,N di isopropyl amine Reflux, 6 hrs (b) Hydrazine hydrate, Tri Ethyl Amine, Ethanol, 0^{O}C-RT, 3 hrs. (d) $POCl_3$, Reflux, 6 hrs

Scheme 2: A plausible mechanism pathway for the formation of 1,2,4-triazole (6a-j).



EXPERIMENTAL SECTION:

All reactions were carried out under argon in oven-dried glassware with magnetic stirring. Unless otherwise noted, all materials were obtained from commercial suppliers and were used without further purification. All solvents were reagent grade. THF was distilled from sodium benzo phenone ketyl and degassed thoroughly with dry argon directly before use. Unless otherwise noted, organic extracts were dried with anhydrous Na_2SO_4, filtered through a fitted glass funnel, and concentrated with a rotary evaporator (20–30 Torr). Flash chromatography was performed with silica gel (200–300 mesh) by using the mobile phase indicated. The NMR spectra were measured with a 400 MHz Bruker Avance spectrometer at 400.1 and 100.6 MHz, for ^1H for ^{13}C, respectively, in $CDCl_3$ solution with tetra methyl silane as internal standard. Chemical shifts are given in ppm (δ) and are referenced to the residual proton resonances of the solvents. Proton and carbon magnetic resonance spectra (^1H NMR and ^{13}C NMR) were recorded using tetra methyl silane (TMS) in the solvent of $CDCl_3$-d_1 or DMSO-d_6 as the internal standard (^1H NMR: TMS at 0.00 ppm, $CDCl_3$ at 7.26 ppm ,DMSO at 2.50 ppm; ^{13}C NMR: $CDCl_3$ at 77.16 ppm, DMSO at 40.00 ppm).

General procedure for synthesis of thieno[2,3-d]pyrimidine-2,4-diol[compound (2)] :

methyl 2-aminothiophene-3-carboxylate (**0.01 m.mol**) and **0.05 m.mol** of urea were intimately mixed with each other, and the mixture was heated for two hours at 200° C. A clear, brown molten mass was formed which solidified upon standing; the solid product was dissolved in warm 1 N sodium hydroxide, and the resulting solution was decolorized with charcoal and then acidified with 2 N hydrochloric acid. The crystalline precipitate formed thereby was collected by vacuum filtration and re crystallized from Water, yielding 72% of thieno[2,3-d]pyrimidine-2,4-diol, M.P. 300° C above.

Yield: 90% (white color solid);
IR (KBr, cm^{-1}): 3440(-OH), 1160 (C-O-C Stretching), 3090(Ar C-H), 1630 (Ar C=C Stretching).
^{1}H NMR (400 MHz; $CDCl_3$): δH 11.44 (S, 1H, -OH), 9.18 (S, 1H, -OH), 6.94 (d, 1H, J_{HH} = 8.0 Hz, Ar-H),), 7.29 (d, J_{HH} = 8.0 Hz, 1H, Ar-H).
^{13}C NMR (100 MHz; $CDCl_3$): δC 128.92, 124.03, 128.11, 159.62, 151.67, 154.75.
LC-MS (70 eV): m/z = 169 $(M+H)^+$.

General procedure for synthesis of 2,4-dichlorothieno[2,3-d]pyrimidine [compound (3)] :

A mixture consisting of 8.4 gm. (**0.05 mol**) of 2,4-di hydroxy-thieno[2,3-d] Pyrimidine (2) and 100 ml. of phosphorus oxychloride was refuxed for ten hours, whereby a clear solution was formed. There after, the excess unre acted phosphorus oxy chloride was evaporated in vacuo, the residual oil was poured into ice water, and the aqueous mixture was extracted with chloroform. The chloroform phase was isolated, washed with water until neutral, then dried over Sodium sulfate, the chloroform was evapo rated in vacuo, and the solid residue was re crystallized from ethanol. 7.6 gm. (**75% of yield**) of 2,4-dichloro thieno[2,3-d]pyrimidine, M.P. 161-162° C., were obtained.
IR (KBr, cm^{-1}): 740(-C-Cl), 3110(Ar C-H), 1660 (Ar C=C Stretching).
^{1}H NMR (400 MHz; $CDCl_3$): δH 6.98 (d, 1H, J_{HH} = 7.0 Hz, Ar-H),), 7.39 (d, J_{HH} = 7.0 Hz, 1H, Ar-H).
^{13}C NMR (100 MHz; $CDCl_3$): δC 126.92, 123.03, 126.11, 153.62, 161.67, 154.75.
LC-MS (70 eV): m/z = 205$(M+H)^+$, 207(M+2), 209(M+4), 9:6:1 It indicates molecule contain two chlorine atoms.

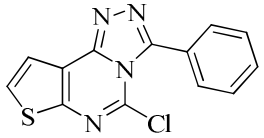
General procedure for synthesis of 2-chloro-4-hydrazinylthieno[2,3-d]pyrimidine[compound (4)] :

A mixture of 2,4-dichlorothieno[2,3-d]pyrimidine [compound (2)] (Compound 2) (**0.1 mol**) in methanol was taken and cooled to 0^oC-5^oC in an ice bath. Tri Ethyl amine (**0.3 mol**) was added to the cold reaction mixture and then hydrazine hydrate (**0.15 mol**) was added slowly at 5^oC-10^oC. The reaction mass was allowed to stir at room temperature for 3 hrs, After completion of starting compound, the excess amount of methanol and Tri Ethyl amine was removed under vacuum. The residue was washed with water, finally petroleum ether then they obtain solid was filtered and Dried under vacuum.
Yield: 84% (pale brown color solid); **m.p.** 202-204°C;
IR (KBr, cm^{-1}): 760(-C-Cl), 3102(Ar C-H), 1650 (Ar C=C Stretching), 3340 (-N-H Stretching, two bands indicates 1^o Amine).
^{1}H NMR (400 MHz; $CDCl_3$): δH 4.68 (s, 2H), 7.60 (S, 2H, Ar-H), 9.6 (1H, S).
^{13}C NMR (100 MHz; $CDCl_3$): δC 126.92, 123.03, 126.11, 173.62, 158.67, 154.25.
MS (70 eV): m/z = 201$(M+H)^+$, 203(M+2), 3:1 It indicates molecule contain one chlorine atom.

General procedure for synthesis of 5-chloro-3-phenylthieno[3,2-e][1,2,4]triazolo[4,3-c]pyrimidine (6a), 5-chloro-3-p-tolylthieno[3,2-e][1,2,4]triazolo[4,3-c]Pyrimidine (6b), 5-chloro-3-(4-methoxyphenyl)thieno[3,2-e][1,2,4]triazolo[4,3-c]Pyrimidine (6c), 5-chloro-3-(4-(trifluoromethoxy)phenyl)thieno[3,2-e][1,2,4]triazolo[4,3-c]Pyrimidine(6d), 5-chloro-3-(4-(trifluoromethyl)phenyl)thieno[3,2-e][1,2,4]triazolo[4,3-c]pyrimidine (6e), 5-chloro-3-(4-chlorophenyl)thieno[3,2-e][1,2,4]triazolo[4,3-c]pyrimidine (6f), 3-(4-bromophenyl)-5-chlorothieno[3,2-e][1,2,4]triazolo[4,3-c]Pyrimidine (6g), 5-chloro-3-(4-nitrophenyl)thieno[3,2-e][1,2,4]triazolo[4,3-c]Pyrimidine(6h), 5-chloro-3-(1H-indol-2-yl)thieno[3,2-e][1,2,4]triazolo[4,3-c]Pyrimidine(6i), 5-chloro-3-(pyridin-3-yl)thieno[3,2-e][1,2,4]triazolo[4,3-c]Pyrimidine (6j):

Compound (4) (**0.1 m. mol**) and substituted benzoic acids (or) Heterocyclic Acids (5a-j) (**0.13 m.mol**) were taken in $POCl_3$ (5 ml) and heated to reflux for 6 hrs.The reaction mass was concentrated under reduced pressure and then quenched in ice water. The Solid obtained was filtered off, washed with water, dried and crystallized from methanol/ Ethanol solvent.
The following compounds were synthesized using this method.

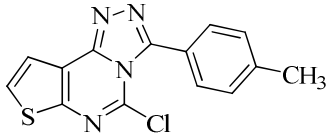
5-chloro-3-phenylthieno[3,2-e][1,2,4]triazolo[4,3-c]pyrimidine (6a):



(6a)

Yield: 84% (brown color solid); **m.p.** 212-214°C;
IR (KBr, cm^{-1}): 755(-C-Cl), 3100(Ar C-H), 1570 (Ar C=C Stretching).
^{1}H NMR (400 MHz; $CDCl_3$): δH 7.40-7.53 (m, 3H, Ar-H), 8.3(2H,t, Ar-H), 6.96 (1H, d, Ar-H), 7.3(1H,d, Ar-H).
^{13}C NMR (100 MHz; $CDCl_3$): δC 126.92, 123.03, 126.11, 153.62, 160.67, 154.25, 134, 128, 131, 133.
LC-MS (70 eV): m/z = 287$(M+H)^+$, 289(M+2), 3:1 It indicates molecule contain one chlorine atom.

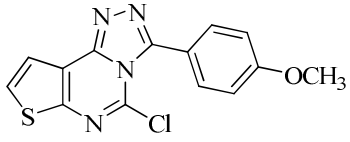
5-chloro-3-p-tolylthieno[3,2-e][1,2,4]triazolo[4,3-c]Pyrimidine (6b):



(6b)

Yield: 81% (yellow color solid); **m.p.** 210-212°C;
IR (KBr, cm^{-1}): 745(-C-Cl), 3110(Ar C-H), 1590 (Ar C=C Stretching), 2960(SP^3 C-H Stretching).
^{1}H NMR (400 MHz; $CDCl_3$): δH 6.96 (1H, d, J_{HH} = 7.0 Hz, Ar-H), 7.3(1H,d, J_{HH} = 7.0 Hz, Ar-H), 8.5(2H, d, J_{HH} = 7.4 Hz, Ar-H), 7.3((2H, d, J_{HH} = 7.4 Hz, Ar-H), 2.36(3H,S).
^{13}C NMR (100 MHz; $CDCl_3$): δC 126.92, 123.03, 126.11, 153.62, 160.67, 154.25, 134, 128, 131, 21.3.
LC-MS (70 eV): m/z = 301$(M+H)^+$, 303(M+2), 3:1 It indicates molecule contain one chlorine atom.

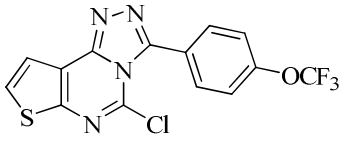
5-chloro-3-(4-methoxyphenyl)thieno[3,2-e][1,2,4]triazolo[4,3-c]Pyrimidine (6c):



(6c)

Yield: 84% (yellow color solid); **m.p.** 250-251°C;
IR (KBr, cm^{-1}): 755(-C-Cl), 1155(C-O-C Stretching), 3095(Ar C-H), 1580 (Ar C=C Stretching), 2950(SP^3 C-H Stretching).
^{1}H NMR (400 MHz; $CDCl_3$): δH 6.96 (1H, d, J_{HH} = 7.0 Hz, Ar-H), 7.3(1H,d, J_{HH} = 7.0 Hz, Ar-H), 7.95(2H, d, J_{HH} = 7.8 Hz, Ar-H), 7.03((2H, d, J_{HH} = 7.8 Hz, Ar-H), 3.86(3H,S).
^{13}C NMR (100 MHz; $CDCl_3$): δC 126.92, 123.03, 126.11, 153.62, 160.67, 154.25, 134, 128, 131.
LC-MS (70 eV): m/z = 317$(M+H)^+$, 318(M+2), 3:1 It indicates molecule contain one chlorine atom.

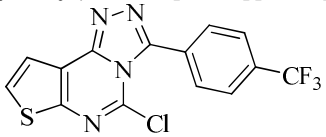
5-chloro-3-(4-(trifluoromethoxy)phenyl)thieno[3,2-e][1,2,4]triazolo[4,3-c]Pyrimidine(6d):



(6d)

Yield: 81% (greenish yellow color solid); **m.p.** 190-191°C;
IR (KBr, cm^{-1}): 735(-C-Cl), 1340(C-F), 3110(Ar C-H), 1580 (Ar C=C Stretching),.
^{1}H NMR (400 MHz; CDCl$_3$): δH 6.96 (1H, d, J_{HH} = 7.0 Hz, Ar-H), 7.3(1H,d, J_{HH} = 7.0 Hz, Ar-H), 7.95(2H, d, J_{HH} = 7.8 Hz, Ar-H), 7.03((2H, d, J_{HH} = 7.8 Hz, Ar-H).
^{13}C NMR (100 MHz; CDCl$_3$): δC 126.92, 123.03, 126.11, 153.62, 160.67, 154.25, 134, 128, 131.
LC-MS (70 eV): m/z = 371(M+H)$^+$, 373(M+2), 3:1 It indicates molecule contain one chlorine atom.

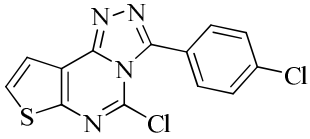
5-chloro-3-(4-(trifluoromethyl)phenyl)thieno[3,2-e][1,2,4]triazolo[4,3-c]pyrimidine (6e):



(6e)

Yield: 81% ((brown color solid); **m.p.** 216-218°C;
IR (KBr, cm^{-1}): 765(-C-Cl), 1340(C-F), 3110(Ar C-H), 1580 (Ar C=C Stretching).
^{1}H NMR (400 MHz; CDCl$_3$): δH 6.96 (1H, d, J_{HH} = 7.0 Hz, Ar-H), 7.3(1H,d, J_{HH} = 7.0 Hz, Ar-H), 8.65(2H, d, J_{HH} = 7.8 Hz, Ar-H), 7.73((2H, d, J_{HH} = 7.8 Hz, Ar-H).
^{13}C NMR (100 MHz; CDCl$_3$): δC 126.92, 123.03, 126.11, 153.62, 160.67, 154.25, 134, 128, 131, 124.
LC-MS (70 eV): m/z = 355(M+H)$^+$, 357(M+2), 3:1 It indicates molecule contain one chlorine atom.

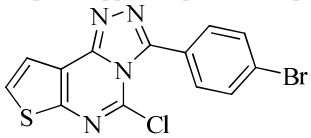
5-chloro-3-(4-chlorophenyl)thieno[3,2-e][1,2,4]triazolo[4,3-c]pyrimidine (6f):



(6f)

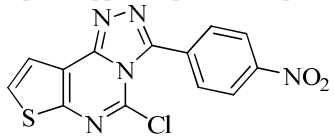
Yield: 81% (pale brown color solid); **m.p.** 186-188°C;
IR (KBr, cm^{-1}): 768(-C-Cl), 3120(Ar C-H), 1590 (Ar C=C Stretching).
^{1}H NMR (400 MHz; CDCl$_3$): δH 6.96 (1H, d, J_{HH} = 7.0 Hz, Ar-H), 7.3(1H,d, J_{HH} = 7.0 Hz, Ar-H), 8.25(2H, d, J_{HH} = 7.8 Hz, Ar-H), 7.53((2H, d, J_{HH} = 7.8 Hz, Ar-H).
^{13}C NMR (100 MHz; CDCl$_3$): δC 127.92, 123.03, 126.11, 153.62, 160.67, 154.25, 134, 128, 131, 124.
LC-MS (70 eV): m/z = 320(M+H)$^+$, 322(M+2), 324(M+4) 9:6:1 It indicates molecule contain two chlorine atoms.

3-(4-bromophenyl)-5-chlorothieno[3,2-e][1,2,4]triazolo[4,3-c]Pyrimidine (6g):



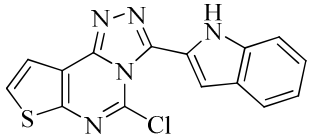
(6g)

Yield: 80% (pale yellow color solid); **m.p.** 218-220°C;
IR (KBr, cm^{-1}): 748(-C-Cl), 540(C-Br), 3120(Ar C-H), 1560 (Ar C=C Stretching).
^{1}H NMR (400 MHz; CDCl$_3$): δH 6.96 (1H, d, J_{HH} = 7.0 Hz, Ar-H), 7.3(1H,d, J_{HH} = 7.0 Hz, Ar-H), 7.65(2H, d, J_{HH} = 7.8 Hz, Ar-H), 7.53((2H, d, J_{HH} = 7.8 Hz, Ar-H).
^{13}C NMR (100 MHz; CDCl$_3$): δC 127.92, 123.03, 126.11, 153.62, 160.67, 154.25, 134, 128, 131, 124.
LC-MS (70 eV): m/z = 364(M+H)$^+$, 366(M+2), 368(M+4) .
5-chloro-3-(4-nitrophenyl)thieno[3,2-e][1,2,4]triazolo[4,3-c]Pyrimidine(6h):



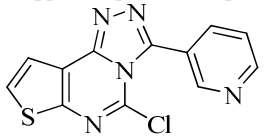
(6h)

Yield: 80% (yellow color solid); **m.p.** 219-221°C;
IR (KBr, cm^{-1}): 768(-C-Cl), 1540 & 1350 (N-O Stretching in Nitro group), 3160(Ar C-H), 1590 (Ar C=C Stretching).
^{1}H NMR (400 MHz; CDCl$_3$): δH 6.76 (1H, d, J_{HH} = 7.0 Hz, Ar-H), 7.2(1H,d, J_{HH} = 7.0 Hz, Ar-H), 8.15(2H, d, J_{HH} = 7.0 Hz, Ar-H), 8.53((2H, d, J_{HH} = 7.0 Hz, Ar-H).
^{13}C NMR (100 MHz; CDCl$_3$): δC 127.92, 123.03, 126.11, 153.62, 160.67, 154.25, 144, 128, 124, 150.
LC-MS (70 eV): m/z = 330(M-H)$^+$, 332(M+2) 3:1 It indicates molecule contain one chlorine atom.
5-chloro-3-(1H-indol-2-yl)thieno[3,2-e][1,2,4]triazolo[4,3-c]Pyrimidine(6i):



(6i)

Yield: 70% (greenish yellow color solid); **m.p.** 239-241°C;
IR (KBr, cm^{-1}): 768(-C-Cl), 3320 (N-H Stretching), 3120(Ar C-H), 1586 (Ar C=C Stretching).
^{1}H NMR (400 MHz; DMSO-d$_6$): δH 6.86 (1H, d, J_{HH} = 7.0 Hz, Ar-H), 7.2(1H,d, J_{HH} = 7.0 Hz, Ar-H), 6.8(1H,S), 6.9(2H, m, Ar-H), 7.53-7.6(2H, m, Ar-H).
^{13}C NMR (100 MHz; CDCl$_3$): δC 127.92, 123.03, 126.11, 153.62, 160.67, 143.25, 124, 100, 128, 120, 113.
LC-MS (70 eV): m/z = 326(M+H)$^+$, 328(M+2) 3:1 It indicates molecule contain one chlorine atom.
5-chloro-3-(pyridin-3-yl)thieno[3,2-e][1,2,4]triazolo[4,3-c]Pyrimidine (6j):



(6j)

Yield: 74% ((brown color solid); **m.p.** 240-242°C;
IR (KBr, cm^{-1}): 758(-C-Cl), 3110(Ar C-H), 1580 (Ar C=C Stretching).
^{1}H NMR (400 MHz; DMSO-d$_6$): δH 6.86 (1H, d, J_{HH} = 7.0 Hz, Ar-H), 7.2(1H,d, J_{HH} = 7.0 Hz, Ar-H), 8.5(1H,d, J_{HH} = 7.4 Hz, Py. Ar-H), 7.6(1H, t, J_{HH} = 7.4 Hz, Py. Ar-H), 8.7(1H, d, J_{HH} = 7.4 Hz, Py. Ar-H), 9.3(1H, S, Py.Ar-H).

^{13}C NMR (100 MHz; $CDCl_3$): δC 127.92, 123.03, 126.11, 153.62, 160.67, 154.25, 134, 135, 124, 148, 155.
LC-MS (70 eV): m/z = 288$(M+H)^+$, 290(M+2) 3:1 It indicates molecule contain one chlorine atom.

Result and Discussion:

Chemistry

The reaction sequences employed for synthesis of title compounds are shown in (**Scheme 1**). In the present work, the starting thieno[2,3-d]pyrimidine-2,4-diol(2) was prepared from methyl 2-amino thiophene-3-carboxylate (1) and Urea according to synthetic procedure was prepared according to synthetic procedure [**XII**]. 2,4-dichlorothieno[2,3-d]pyrimidine (3) was prepared according to synthetic procedure [**XIII**]. The 2-chloro-4-hydrazinylthieno[2,3-d] pyrimidine (4) was prepared according to synthetic procedure [**XIV**], which on further treatment with different Substituted Carboxylic acids 5(a-j) in $POCl_3$ gave 2-(5-chlorothieno[3,2-e][1,2,4]triazolo[4,3-c]pyrimidin-3-yl)-5-Substituted benzene-1-ylium (6 a-j) according to synthetic procedure [**XV**], which were treated with thiophene-2-boronic acid (7) under Suzuki reaction conditions to get Target Novel Thieno Pyrimidine derivatives (8a-j) according to synthetic procedure [**XVI**]. All compounds displayed IR, ^{1}H and ^{13}C NMR and mass spectra consistent with the assigned structures.^{1}H NMR and IR spectrum of compounds (6 a-j) showed singlet at 2.3 ppm, 3.8 ppm are due to the aromatic methyl group protons and Aromatic methoxy group protons. The most characteristic IR absorption bands are at 1140 cm^{-1} (C-O-C), 750 cm^{-1} (C-Cl) and 1324 & 1552 cm^{-1} (N-O Stretching in Nitro group). The mass spectra of all the final derivatives showed comparable molecular ion peak with respect to molecular formula.

Conclusion

The research study reports the successful synthesis of 1, 2,4-triazole having thieno pyrimidine moiety.

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