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A FACILE SYNTHESIS AND BIOLOGICAL SIGNIFICANCE OF 2-PYRROLIDINONES DERIVATIVES

Rekha M. Patel[1], Sarju N. Prajapati[2] and Kokila A. Parmar*

*Department of Chemistry, H.N.G.University, Patan.

[1]M.M. Patel Institute of Science and Research, Kadi.

[2]Sheth P.T. Arts and Science College, Godhra.

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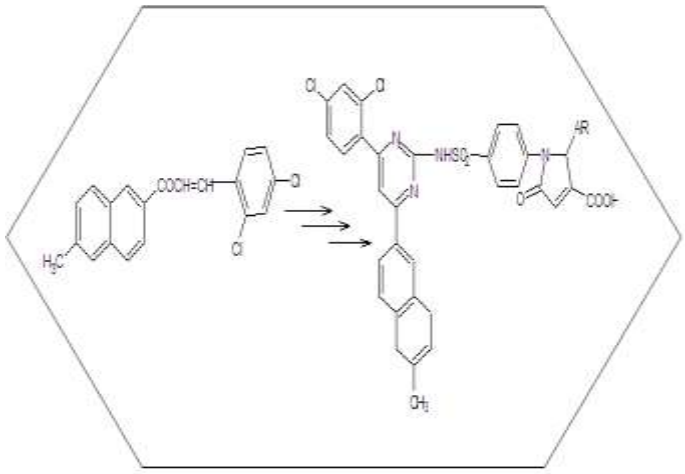
***Corresponding Author**
Dr. Kokila A. Parmar
Department of Chemistry,
H.N.G.University, Patan



ABSTRACT

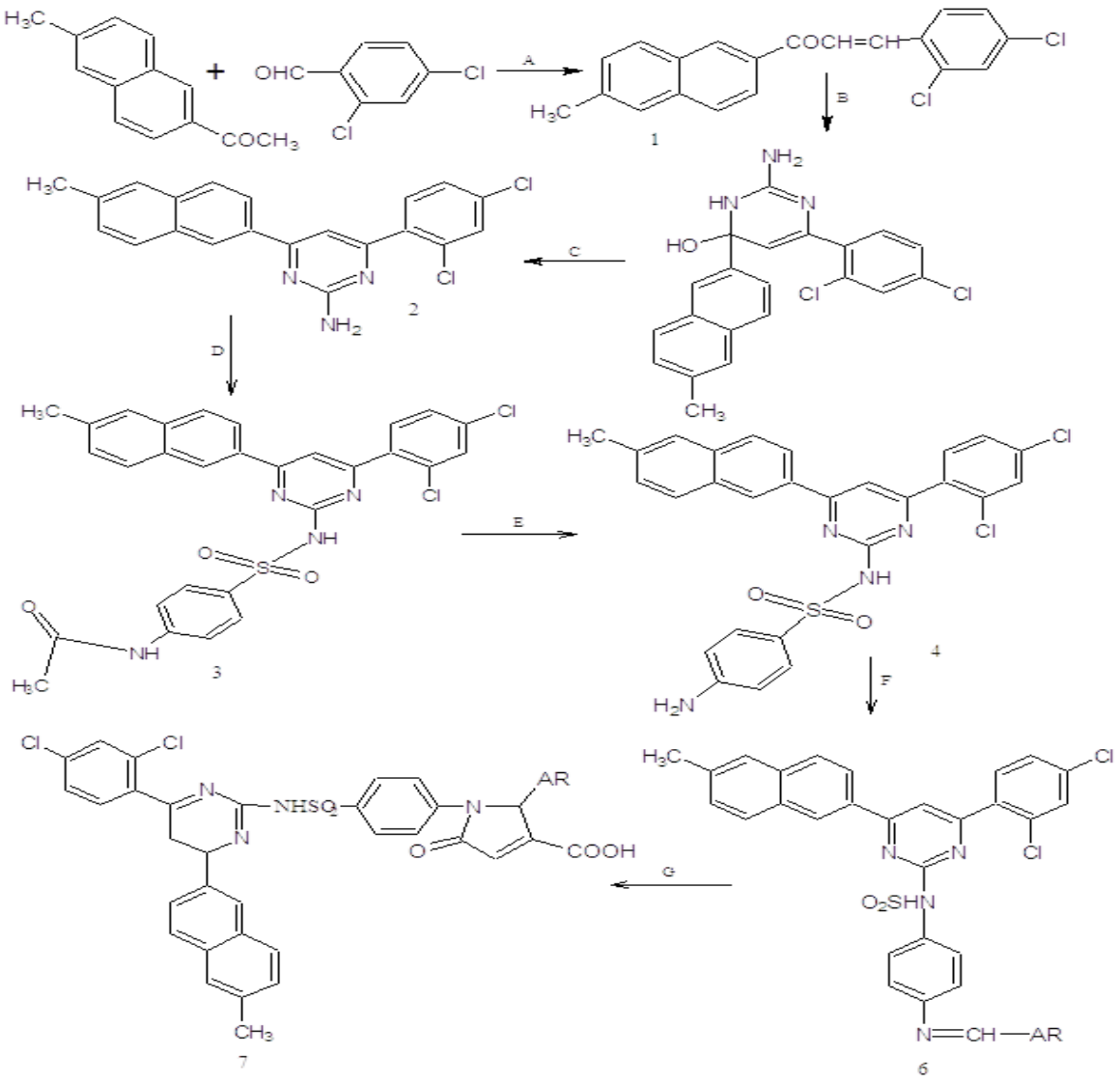
2-Pyrrolidinones are one of the heterocyclic compounds with very important biological activites. In this view, it was proposed to synthesize some novel 2-Pyrrolidinones from Schiff bases. Here the synthesis of 2-Pyrrolidinones using 4-amino-N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)benzenesulfonamide and succinic anhydride under basic condition in presence of ethanol. The structures of synthesized were assigned on the basis of elemental analysis, IR and 1H NMR spectroscopy data. These compounds were screened for their anti-bacterial activity.

KEYWORDS: 2-Pyrrolidinones, Antibacterial activity, Schiff bases.

INTRODUCTION

Substituted 2-pyrrolidinones have seen wide use in medicinal chemistry, both as model compounds to study interactions of larger compounds and as pharmaceuticals. Heterocyclic compounds are the well-known class of compounds for its biological applications out of

which 2-pyrrolidinone occupy unique position due to dominate applications.[1-5]. 2-pyrrolidinone is heterocyclic compounds which possess wide range of biological activities such as anti-bacterial and anti-fungal.[6-7] 2- Pyrrolidinone can be used as antiarrhythmic and antihypertensive.[8], anti-amnestic.[9] as metabotropic glutamate receptor antagonists.[10], inhibitor.[11], in diseases related to connective tissue degradation.[12], transdermal and dermal enhancing activity.[13], anticonvulsant.[14] and can also use as antipsychotic and anti-ischemic activity.[15] These compounds are containing biological as well as pharmacological activities.[16-21] Various 2- pyrrolidinone derivatives were prepared by condensation of Schiff base of PFP and succinic anhydride. Also further some of benzimidazole derivatives were synthesized by condensation of some of 2-pyrrolidinone derivatives with ophenylene diamine .[22-26] The synthetic approach is shown in Scheme-1.



Reaction Scheme

Reaction reagent and condition

A= 40% KOH, OH^- E= Hydrolysis

B= Guinidine Hydrochloride, F= Various Aldehyde (5a-h)

C= $-H_2O$, $-H_2$ G= Succinic anhydride

D= P-Acetyl-aminobenzenesolphonyl chloride and pyridine

METHODOLOGY

Synthesis of 3-(2,4-dichlorophenyl)-1-(6-methylnaphthalen-2-yl)prop-2-en-1-one (1)

To a well stirred solution of 2,4-dichloro benzaldehyde (0.01 mole) and 1-(6-methylnaphthalen-2-yl)ethanone (0.01 mole) in ethanol (35 ml), 40% KOH added till the solution become basic. The reaction mixture was stirred for 24 hrs. The contents were poured into ice, acidified, filtered and crystallized from ethanol.

Synthesis of 4-amino-N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)benzenesulfonamide (2)

A mixture of Chalcone (0.01 mole) in 25 ml of absolute alcohol, add Guanidine Hydrochloride (0.015 mole) and sodium hydroxide (0.045 mole in 2 ml of water) was refluxed in water bath at temp 80-90°c for 8 hr. The reaction mixture was poured into ice. The product was isolated and crystallized from ethanol.

Synthesis of N-(4-(N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)sulfamoyl)phenyl)acetamide (3)

The derivative was prepared by reactions of amino pyrimidine **(2)** (0.01 mole) with *P*-Acetylamino-benzenesulfonyl chloride (0.012 mole) in dry pyridine (30 ml) was heated to 70-75°C on a water bath for 5 hr. the cold reaction mixture was acidified with dil. hydrochloric acid. The solid that separated was filtered, washed several times with hot water, dried and crystallized from proper solvent.

4-amino-N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl) benzenesulfonamide (4)

N-(4-(N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)sulfamoyl) phenyl)acetamide (**3**) was hydrolysed by refluxing 0.5-1.0 molar solution containing 3.5 equivalents of sodium hydroxide for two hours. After this period, the mixture was cooled to room temperature and neutralized with concentrated HCl pH by approximately 6.0. The mixture was cooled in the ice bath until the total precipitation of the product, the filtered

vacuum, washed with small volume of water ice and purification by recrystallization from ethanol to give white product.

Synthesis of 4-(benzylideneamino)-N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)benzenesulfonamide (6 a-h)

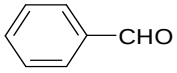
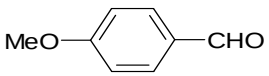
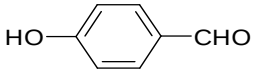
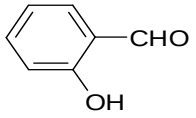
The various Schiff bases (6a-h) of 4-amino-N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)benzenesulfonamide **(4)** have been prepared in the similar manner. The procedure is as follow:

A mixture of equimolar amount (0.01 mole) of of 4-amino-N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)benzenesulfonamide **(4)** and the Substituted Benzaldehydes **(5)** in absolute ethanol (70 ml) and piperidine (0.5 ml) was refluxed for 10 hr. in a water bath. The reaction mixture was concentrated, cooled and poured into ice cold water the solid obtained was filtered and recrystallized from absolute ethanol to give white Schiff base.

Synthesis of 1-(4-(N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl) sulfamoyl)phenyl)-5-oxo-2-phenylpyrrolidine-3-carboxylic acid (7a-h)

Succinic anhydride (0.1mole) and an imine (**6a-h**) (0.1mole) were heated at reflux in chloroform (30 ml) for about 5 hours with TLC monitoring. After the mixture was allowed to stand for 2 days, the solid was filtered. The product thus formed was recrystallized from ethanol to give pure 1-(4-(N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)sulfamoyl)phenyl)-5-oxo-2-phenylpyrrolidine-3-carboxylic acid (**7a-h**) in good yield.

Table 1: The benzaldehyde derivatives (5a-h) used for Schiff bases formation of 4-amino-N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl) benzenesulfonamide (4)

No.	Benzaldehyde derivative	Structure
5a	Benzaldehyde	
5b	4-Methoxy benzaldehyde	
5c	4-Hydroxy benzaldehyde	
5d	2-Hydroxy benzaldehyde	

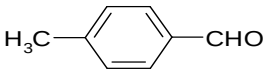
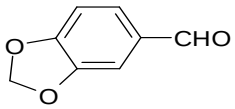
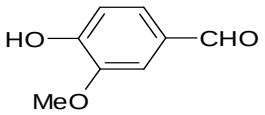
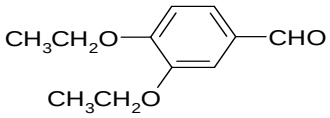
5e	4-Methyl benzaldehyde	
5f	3,4-Methylenedioxy benzaldehyde (i.e. Veretral)	
5g	4-Hydroxy-3-methoxy benzaldehyde	
5h	3,4-Diethoxy benzaldehyde	

Table 2: Physical characterization constant of 4-(benzylideneamino)-N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)benzenesulfonamide (6 a-h)

Com. No	Molecular Formula	-Ar	Molecular Weight	Elemental analysis, Cal/Found			
				%C	%H	%N	%S
6a	$C_{34}H_{24}Cl_2N_4O_2S$	Phenyl	622.10 gm/mole	65.49 65.19	3.88 3.57	8.99 8.89	5.14 5.10
6b	$C_{35}H_{26}Cl_2N_4O_3S$	4-Methoxy phenyl	652.11 gm/mole	64.32 64.12	4.01 3.92	8.57 8.51	4.91 4.86
6c	$C_{34}H_{24}Cl_2N_4O_3S$	4-Hydroxy phenyl	638.09 gm/mole	63.85 63.55	3.78 3.65	8.76 8.56	5.01 5.00
6d	$C_{34}H_{24}Cl_2N_4O_3S$	2-Hydroxy phenyl	638.09 gm/mole	63.85 63.55	3.78 3.65	8.76 8.56	5.01 5.00
6e	$C_{34}H_{26}Cl_2N_4O_2S$	4-Methyl phenyl	636.12 gm/mole	63.93 63.73	4.11 4.01	8.89 8.79	5.03 5.00
6f	$C_{35}H_{24}Cl_2N_4O_4S$	3,4-Methylenedioxy phenyl	666.09 gm/mole	62.97 62.81	3.62 3.55	8.39 8.32	4.80 4.70
6g	$C_{35}H_{26}Cl_2N_4O_4S$	4-Hydroxy-3-methoxy phenyl	668.11 gm/mole	62.78 62.68	3.91 3.76	8.37 8.30	4.79 4.73
6h	$C_{38}H_{32}Cl_2N_4O_4S$	3,4-Diethoxy phenyl	710.19 gm/mole	64.13 64.00	4.53 4.48	7.87 7.81	4.51 4.44

Table3: Physical characterization constant of N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)-4-(4-oxo-2-phenylthiazolidin-3-yl) benzenesulfonamide (7a-h)

Com. No	Molecular Formula	-Ar	Molecular Weight	Elemental analysis, Cal/Found			
				%C	%H	%N	%S
7a	$C_{38}H_{28}Cl_2N_4O_5S$	Methylbenzene	722.12 gm/mole	63.07 63.01	3.90 3.78	7.74 7.66	4.43 4.40
7b	$C_{39}H_{30}Cl_2N_4O_6S$	1-Methoxy-4-methylbenzene	752.13 gm/mole	62.15 62.01	4.01 3.90	7.43 7.38	4.25 4.20
7c	$C_{38}H_{28}Cl_2N_4O_6S$	4-Methylphenol	738.11 gm/mole	61.71 61.62	3.82 3.75	7.58 7.50	4.34 4.27
7d	$C_{38}H_{28}Cl_2N_4O_6S$	2-Methylphenol	738.11 gm/mole	61.71 61.66	3.82 3.80	7.58 7.45	4.34 4.24

7e	$C_{39}H_{30}Cl_2N_4O_5S$	1,4-Dimethylbenzene	736.13 gm/mole	63.50 63.41	4.10 4.01	7.60 7.52	4.35 4.27
7f	$C_{39}H_{28}Cl_2N_4O_7S$	5-Methyl-1,3-benzodioxole	766.11 gm/mole	61.02 60.92	3.68 3.60	7.30 7.24	4.18 4.12
7g	$C_{39}H_{30}Cl_2N_4O_7S$	2-Methoxy-4-methylphenol	768.12 gm/mole	60.86 60.77	3.93 3.85	7.28 7.21	4.17 4.10
7h	$C_{42}H_{36}Cl_2N_4O_7S$	1,2- Diethoxy-4-methylbenzene	810.17 gm/mole	62.15 62.07	4.47 4.40	6.90 6.82	3.95 3.90

RESULTS AND DISCUSSION

SPECTRAL STUDIES

IR spectra of 4-amino-N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)benzenesulfonamide (4)

Sulfa pyrimidine is a heterocyclic compound. It is an aromatic compound thus it provides the IR frequencies. The bands due to pyrimidine are at 3220-3440 cm^{-1} and 1610-1640cm^{-1} corresponds to N-H (str.) and C=N groups. The peak at 1630cm^{-1} is indicative of C=N, 1600 cm^{-1} due to C=C cm^{-1}, and 1310 cm^{-1} and 1150 cm^{-1} diagnostic for the presence of the sulphonamido group (-SO_2NH-) also The corresponding N-H in plane and out of plane bending vibrations occurs at 1630 and 699 cm^{-1} respectively.

NMR spectra of 4-amino-N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)benzenesulfonamide (4)

The signal at 4.0 ppm is responsible for N-H proton of pyrimidine –SO_2NH-, signal at 6.35 ppm is responsible for -NH_2 proton, and multiple signals between 6.15-7.8 ppm are responsible for aromatic proton. While signal at 2.30 due to two –CH_3 on benzene ring.

CMR spectra of 4-amino-N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl) pyrimidin-2-yl)benzenesulfonamide (4)

The signals at 101.7 (C_5), 162.5 (C_4), 165.4 (C_6) and 169.3 (C_2) ppm are responsible for pyrimidine multiple signals between 114-140 ppm are responsible for aromatic segments. While signal at 18.8 and 19.1 are due to two –CH_3.

Finally the structure of compound conform by LC-MS compound (4) shows peak of (m/Z) at 534.07 which consistent with the calculated molecular weight of Compound (4) i.e. 534.07.

Spectral Studies of compound 6a-6h

4-(benzylideneamino)-N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)benzenesulfonamide 6a

Yield: 60%, MP 193^{0}C, Infrared Spectral Features around cm^{-1}3030, 1500, Aromatic C-H stretching , 1600- 1641 - CH=N-, 1315-1375 -SO_2-, 3250-3330 -NH- of -SO_2NH-, PMR spectral Features (δ ppm) 6.5-8.5 multiplet, aromatic + CH of CH=N protons + H of Pyrimdine + H of SO_2NH +), ^{13}CMR spectral Features (δ ppm) 114-131- Benzene, 134 -Ar-Cl, 160- CH=N, 162-169 -pyrimidine.

N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)-4-(4-methoxybenzylideneamino)benzenesulfonamide 6b

Yield: 61%, MP 197^{0}C**,** Infrared Spectral Features around cm^{-1}3030, 1500, Aromatic C-H stretching, 1600-1640-CH=N-, 1315-1375 -SO_2-, 3250-3330 -NH- of -SO_2NH-, 1200 -Ar-O-alkyl, PMR spectral Features (δ ppm) 6.5-8.6 (multiplet, aromatic+ CH of CH=N protons + H of Pyrimidine + H of SO_2NH) 3.85(3H, singlet, OCH_3), ^{13}CMR spectral Features (δ ppm) 114-131-Benzene, 134 -Ar-Cl, 160 -CH=N, 162-169 pyrimidine, 163-C-O, 56 -CH_3

N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)-4-(4-hydroxybenzylideneamino)benzenesulfonamide 6c

Yield: 60%, MP 199^{0}C**,** Infrared Spectral Features around cm^{-1}3370-OH, 3030, 1500, Aromatic C-H stretching, 1600-1640 -CH=N-, 1315-1375 -SO_2-, 3250-3330 -NH- of -SO_2NH-, PMR spectral Features (δ ppm) 6.5-8.6 (multiplet, aromatic+ CH of CH=N protons + H of Pyrimidine + H of SO_2NH) 3.85 (3H, singlet, OCH_3), ^{13}CMR spectral Features(δ ppm) 114-131-Benzene, 134- Ar-Cl, 160 -CH=N, 162-169 - pyrimidine, 163 -C-O.

N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)-4-(2-hydroxybenzylideneamino)benzenesulfonamide 6d

Yield: 62%, MP 191^{0}C**,** Infrared Spectral Features around cm^{-1}3370-OH, 3030, 1500, Aromatic C-H stretching, 1600-1640-CH=N-, 1315-1375-SO_2-, 3250-3330-NH- of -SO_2NH-, PMR spectral Features (δ ppm) 6.5-8.6 (multiplet, aromatic + CH of CH=N protons + H of Pyrimidine + H of SO_2NH) 3.85 (3H, singlet, OCH_3), ^{13}CMR spectral Features (δ ppm) 114-131-Benzene, 134- Ar-Cl, 160 - CH=N, 162-169 -pyrimidine, 163 -C-O.

N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)-4-(4-methylbenzylideneamino)benzenesulfonamide 6e

Yield: 62%, MP 193^{0}C**,** Infrared Spectral Features around cm^{-1} 2950, 1370 - CH_3, 3030, 1500, Aromatic C-H stretching, 1600-1640 -CH=N-, 1315-1375 -SO_2- ,3250-3330 -NH- of -SO_2NH-, PMR spectral Features (δ ppm) 6.5-8.7 (multiplet, aromatic+ CH of CH=N protons + H of Pyrimidine + H of SO_2NH) 2.34 (3H, singlet, CH_3), ^{13}CMR spectral Features (δ ppm)114-131-Benzene, 134- Ar-Cl, 160 - CH=N, 162-169 -pyrimidine, 21-CH_3.

4-(benzo[d][1,3]dioxol-5-ylmethyleneamino)-N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)benzenesulfonamide 6f

Yield: 60%, MP 201^{0}C,Infrared Spectral Features around cm^{-1}2920, 2850 - CH_2-, 1450, 3030, 1500, Aromatic C-H stretching, 1600–1640 -CH=N-, 1315-1365 -SO_2-, 3250-3330 -NH- of -SO_2NH-, PMR spectral Features (δ ppm) 6.5-8.7 (multiplet, aromatic+ CH of CH=N protons + H of Pyrimidine + H of SO_2NH) 6.07 (2H, singlet, -O-CH_2-O-), ^{13}CMR spectral Features (δ ppm) 101.2 -CH_2-O-, 114-131-Benzene, 134- Ar-Cl, 160 -CH=N, 162-169 - pyrimidine, 21-CH_3.

N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)-4-(3-hydroxy-4-methoxybenzylideneamino)benzenesulfonamide 6g

Yield: 57%, MP 199^{0}C**,** Infrared Spectral Features around cm^{-1} 3370 -OH, 2950,1370 -CH_3, 3030,1500, Aromatic C-H stretching, 1600-1640 -CH=N-, 1315-1375 -SO_2-, 3250-3330 -NH- of -SO_2NH-, PMR spectral Features (δ ppm) 6.5-8.7 (multiplet, aromatic+ CH of CH=N protons + H of Pyrimidine + H of SO_2NH) 3.83 (3H, singlet, -O-CH_3) 5.35 (1H, Singlet, -OH), ^{13}CMR spectral Features (δ ppm) 114-131-Benzene, 134- Ar-Cl, 160 - CH=N, 162-169 -pyrimidine, 149-151 -C - O, 56-OCH_3.

N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)-4-(3,4-diethoxybenzylideneamino)benzenesulfonamide 6h

Yield: 60%, MP 190^{0}C, Infrared Spectral Features around cm^{-1}2950,2820, -CH_2-, 1450,3030,1500, Aromatic C-H stretching, 1600-1640 -CH=N-, 1315-1375 -SO_2-, 3250-3330 -NH- of -SO_2NH-, PMR spectral Features (δ ppm) 6.5-8.7 (multiplet, aromatic + CH of CH=N protons + H of Pyrimidine + H of SO_2NH) 4.0 (4H, quartet, 2CH_2) 1.33 (6H, triplet, 2CH_3), ^{13}CMR spectral Features (δ ppm) 114-131-Benzene, 134- Ar-Cl, 160 - CH=N, 162-169 - pyrimidine, 149-151 -C-O.

1-(4-(N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl) sulfamoyl)phenyl)-5-oxo-2-phenylpyrrolidine-3-carboxylic acid 7a

Yield: 62%, MP 197-98^{0}C, Infrared Spectral Features around cm^{-1} 3054, 1600, 1532 Aromatic C-H stretching, 1667 C=O of COOH, 1717 C=O of pyrrolidinone, and other band are similar to schiff bases. NMR spectral Features (δ ppm) 6.5-8.0 (multiplet, aromatic + H of Pyrimidine+H of SO_2NH), 5.0 (H, d, C_2), 2.5-2.7 (2H, d, C_4), 3.3-3.8 (1H, q, C_3), 11.00 (H, s, COOH), ^{13}CMR spectral Features (δ ppm) 102-131- Benzene, 134- Ar-Cl, 163-169- pyrimidine, 178.3 C of COOH, 174.9 C of CO, 50.2 C_2H of pyrrol ring.

1-(4-(N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl) sulfamoyl)phenyl)-2-(4-methoxyphenyl)-5-oxopyrrolidine-3-carboxylic acid 7b

Yield: 61%, MP 185-86^{0}C, Infrared Spectral Features around cm$^-$ 3054, 1600, 1532 Aromatic C-H stretching, 1670 C=O of COOH, 1717 C=O of pyrrolidinone, 1200 Ar-O-CH_3 and other band are similar to schiff bases. NMR spectral Features (δ ppm) 6.5-8.0 (multiplet, aromatic + H of Pyrimidine + H of SO_2NH), 5.0 (H, d, C_2), 2.5-2.7 (2H, d, C_4), 3.3-3.8 (1H, q, C_3), 11.00 (H, s, COOH), 3.83 (3H, S, OCH_3), ^{13}CMR spectral Features (δ ppm) 102-131- Benzene, 134- Ar-Cl, 163-169- pyrimidine, 178.3 C of COOH, 174.9 C of CO, 50.2 C_2H of pyrrol ring, 55.8 –OCH_3.

1-(4-(N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl) sulfamoyl)phenyl)-2-(4-hydroxyphenyl)-5-oxopyrrolidine-3-carboxylic acid 7c

Yield: 60%, MP 195-96^{0}C, Infrared Spectral Features around cm^{-1} 3030, 1600, 1500 Aromatic C-H stretching, 1670 C=O of COOH, 1717 C=O of pyrrolidinone, 3200-2600 –OH phenolic, and other band are similar to schiff bases. NMR spectral Features (δ ppm) 6.5-8.0 (multiplet, aromatic + H of Pyrimidine + H of SO_2NH), 5.0 (H, d, C_2), 2.5-2.7 (2H, d, C_4), 3.3-3.8 (1H, q, C_3), 11.00 (H, s, COOH), 5.35 (H, S, -OH), ^{13}CMR spectral Features (δ ppm) 102-131- Benzene, 163-169- pyrimidine, 178.3 C of COOH, 174.9 C of CO, 50.2 C_2H of pyrrol ring.

1-(4-(N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl) sulfamoyl)phenyl)-2-(2-hydroxyphenyl)-5-oxopyrrolidine-3-carboxylic acid 7d

Yield: 58%, MP 190-91^{0}C, Infrared Spectral Features around cm^{-1} 3030, 1600, 1500 Aromatic C-H stretching, 1670 C=O of COOH, 1717 C=O of pyrrolidinone, 3200-2600 –OH phenolic, and other band are similar to schiff bases. NMR spectral Features (δ ppm) 6.5-8.0

(multiplet, aromatic + H of Pyrimidine + H of SO_2NH), 5.0 (H, d, C_2), 2.5-2.7 (2H, d, C_4), 3.3-3.8 (1H, q, C_3), 11.00 (H, s, COOH), 5.35 (H, S, -OH), ^{13}CMR spectral Features (δ ppm) 102-131- Benzene, 163-169- pyrimidine, 178.3 C of COOH, 174.9 C of CO, 50.2 C_2H.

1-(4-(N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl) sulfamoyl)phenyl)-5-oxo-2-p-tolylpyrrolidine-3-carboxylic acid 7e

Yield: 63%, MP 191-92^{0}C, Infrared Spectral Features around cm^{-1} 3030, 1600, 1500 Aromatic C-H stretching, 1670 C=O of COOH, 1717 C=O of pyrrolidinone, 2950, 1370 – CH_3, and other band are similar to schiff bases. NMR spectral Features (δ Ppm) 6.5-8.0 (multiplet, aromatic + H of Pyrimidine + H of SO_2NH), 2.5-2.7 (2H, d, C_4), 11.00 (H, s, COOH), 3.3-3.8 (1H, q, -C_3), ^{13}CMR spectral Features (δ Ppm) 102-131- Benzene, 163-169- pyrimidine, 178.3 C of COOH, 174.9 C of CO, 21.3 CH_3.

2-(benzo[d][1,3]dioxol-5-yl)-1-(4-(N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)sulfamoyl)phenyl)-5-oxopyrrolidine-3-carboxylic acid 7f

Yield: 60%, MP 184-85^{0}C**,** Infrared Spectral Features around cm^{-1} 3030, 1600, 1500 Aromatic C-H stretching, 1670 C=O of COOH, 1717 C=O of pyrrolidinone, 1200 Ar-O-alkyl, and other band are similar to schiff bases. NMR spectral Features (δ ppm) 6.5-8.0 (multiplet, aromatic + H of Pyrimidine + H of SO_2NH), 5.0 (H, d, C_2), 2.5-2.7 (2H, d, C_4), 11.00 (H, s, COOH), 2.34 (3H, S, -CH_3), ^{13}CMR spectral Features (δ ppm) 102-131- Benzene, 163-169- pyrimidine, 178.3 C of COOH, 174.9 C of CO, 101.2 –O-CH_2-O.

1-(4-(N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)sulfamoyl) phenyl)-2-(4-hydroxy-3-methoxyphenyl)-5-oxopyrrolidine-3-carboxylic acid 7g

Yield: 60%, MP 184-85^{0}C, Infrared Spectral Features around cm^{-1} 3030, 1600, 1500 Aromatic C-H stretching, 1670 C=O of COOH, 1717 C=O of pyrrolidinone, 3200-2600 –OH phenolic, 1200 Aryl-alkyl ether, and other band are similar to schiff bases. NMR spectral Features (δ ppm) 6.5-8.0 (multiplet, aromatic + H of Pyrimidine + H of SO_2NH), 5.0 (H, d, C_2), 2.5-2.7 (2H, d, C_4), 3.3-3.8 (1H, q, C_3), 11.00 (H, s, COOH), 3.83 (3H, S, -OCH_3), ^{13}CMR spectral Features (δ ppm) 102-131- Benzene, 163-169- pyrimidine, 178.3 C of COOH, 174.9 C of CO, 50.2 C_2H, 56.1 –OCH_3.

1-(4-(N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)sulfamoyl) phenyl)-2-(3,4-diethoxyphenyl)-5-oxopyrrolidine-3-carboxylic acid 7h

Yield: 62%, MP 191-92^{0}C, Infrared Spectral Features around cm^{-1} 3030, 1600, 1500 Aromatic C-H stretching, 1670 C=O of COOH, 1717 C=O of pyrrolidinone, 1200 Aryl-alkyl ether, other band are similar to schiff bases.NMR spectral Features (δ ppm) 6.5-8.0 (multiplet, aromatic + H of Pyrimidine + H of SO_2NH), 2.5-2.7 (2H, d, C_4), 3.3-3.8 (1H, q, C_3), 11.00 (H, s, COOH), 4.0-4.10 (4H, q, $2CH_2$), ^{13}CMR spectral Features (δ ppm) 102-131-Benzene, 163-169 -pyrimidine, 178.3 C of COOH, 174.9 C of CO, 50.2 C_2H, 64.9 –OCH_2.

Table 4: Antimicrobial activity of Standards and Solvent (DMF)

No.	Name of compound	Zone of inhibition (in mm)			
		Gram positive		Gram negative	
		B.Subtillis	*S.Aureus*	*E.Coli*	*Ps.Aeruginosa*
1	DMF	8	5	6	7
2	Ampicillin	15	12	20	20
3	Tetracyclin	21	22	15	18
4	Gentamycin	20	19	18	22
5	Chloramphenicol	21	23	17	24

Table 5: Antimicrobial activity of 4-(arylideneamino)-N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)benzenesulfonamide (6a-h)

Compound (Designation)	Zone of Inhibition (in mm)			
	Gram positive		Gram negative	
	B.Subtillis	*S.Aureus*	*E.Coli*	*Ps.Aeruginosa*
6a	12	13	08	12
6b	10	12	10	10
6c	14	14	15	10
6d	10	10	08	09
6e	06	16	12	20
6f	13	11	10	14
6g	21	19	14	16
6h	14	14	18	17

Table 6: Antimicrobial activity 1-(4-(N-(4-(2,4-dichlorophenyl)-6-(6-methylnaphthalen-2-yl)pyrimidin-2-yl)sulfamoyl)phenyl)-5-oxo-2-phenylpyrrolidine-3-carboxylic acid (7a-h)

Compound (designation)	Zone of Inhibition (in mm)			
	Gram positive		Gram negative	
	B.Subtillis	*S.Aureus*	*E.Coli*	*Ps.Aeruginosa*
7a	12	12	20	19
7b	14	17	14	18
7c	16	10	08	22
7d	22	17	14	13
7e	11	09	13	11

7f	15	13	05	14
7g	07	05	06	16
7h	15	17	14	21

CONCLUSIONS

In conclusion, a new series of compound 6(a-h) and 7(a–h) were synthesized, compounds screened for their spectral study and biological study. The investigation of antimicrobial activities data revealed that the compounds **(**7a**),** **(**7b**),** (7c), **(**7d**)** and **(**7h**),** displayed excellent activity, the compounds(7e), (7f) and (7g) showed moderate activity and rested compound with standard drugs.

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