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PREPARATION AND DIAGNOSIS OF SOME HETEROCYCLIC COMPOUNDS OF 2-THIOPYRIMIDINE AND STUDYING THE BIOLOGICAL EFFECTIVENESS OF SOME OF THEM

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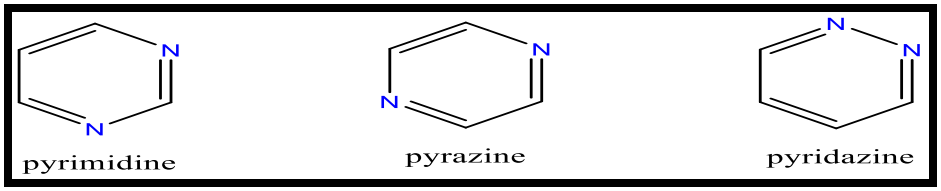
Abstract: New derivatives of 2-thiopyrimidine compounds are prepared in this study by reacting chalcone with thiourea in the basic environment. Equivalent moles of 1-methyl-2-acetylpyrrole and one of the aromatic benzaldehyde substituents were reacted to produce chalcone. To assure accuracy and precision, spectroscopic analytical techniques including melting point, colour, 1H-NMR, 13C-NMR, and FT-IR spectroscopy were employed. Validity of ready automobiles. Staphylococcus aureus and Escherichia coli were the two species of bacteria used to assess the biological activity.

Keywords: 2-thiopyrimidine, biological activity.

Introduction:

Hexacyclic compounds in the form of 1,3-pyrimidines consist of four carbon atoms and two nitrogen atoms, and the type of compound determines its location[1]. Two nitrogen atoms in the ring [2], depending on their location in the atoms



Some pyrimidine derivatives are used as drugs because pyrimidine rings are found in vitamin B, thymine, riboflavin, and folate [3]. It has several fascinating biological actions and is important to organic biochemistry. [4]. Since the ring contains two nitrogen atoms, many pyrimidine compounds Pyrimidines display important biological and medicinal activities. Studies of the following compounds have shown high activity against certain types of fungi[5]

2. Experimental

2.1. Materials: All chemicals used throughout this work were purchased from Fluka, Aldrich, BDH. 2.2.

Tools utilized: Melting points were measured using Automatic Melting Point\SMP40 melting point type measuring equipment and were not adjusted. Iodine was used to enhance the spots in thin layer chromatography (TLC), which tracked the reaction using silica gel polygram plates as the stationary phase. A Fourier transform infrared device with a KBr disk and a scale of (400-4000) cm-1 FT-IR-600 was used to record the infrared spectrum. The synthesized compounds' nuclear magnetic resonance spectra (1H, 13C-NMR) were measured at the Santi MS5973 Agilent Technology, Germany facilities, which are utilized by

Sharif University in Iran. Bruker 500 MHz, where the frequency is 500 MHz and the solvent is (DMSO-d) 6.

2.3. Prepared pyrimidine compounds [6] (N19Sh / N24Sh)

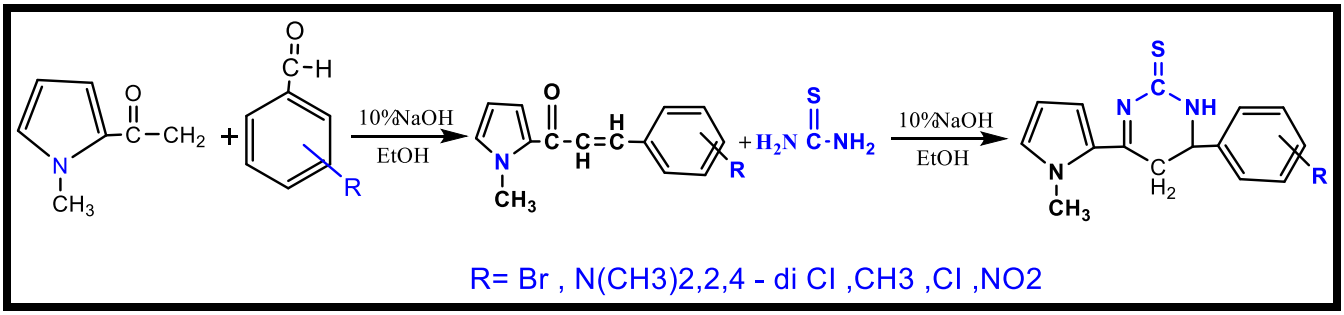
Equal moles (0.00081mole) of the prepared chocolate (N19Sh / N24Sh) were reacted with thiourea, where the chocolate was dissolved in (10ml) of sodium hydroxide solution dissolved in ethanol at a concentration of (10%), and it was left on the heat and stirring for (10) minutes. Then, the thiourea dissolved in (6ml) of ethanol was added to the reaction flask. The mixture rose for (5-6 hours)[6], and sediments of different colours and percentages were obtained, which were filtered, dried, and purified. The course of the reaction was traced using TLC plates, as shown in Table (1)

2.4. Antibacterial activity of the prepared compounds (N19Sh/N24Sh)

The diffusion approach was used to assess the biological activity. On the other hand, the Kirby-Bauer action was used to measure biological activity[7]. In this method, 0.1 ml of bacterial suspension was added to old Mueller-Hinton dishes, and the remaining material was allowed to absorb for five minutes[8][9]. The dishes were then incubated for twenty-four hours at 37 o'clock after holes were made for each dish using a cork purifier and five mm diameter holes for each hole (0.1 ml of solutions intended for the fourth hole using DMSO as a reference sample) [10, 11]. Using the Prescott approach, the widths of the inhibition zones surrounding each hole were measured in millimetres [12,13].

3. Results and discussion.

The vehicles were prepared as shown in the following diagram ,as shown in Scheme (1)



Scheme (1): Prepared Vehicle Road (N19Sh / N24Sh)

3.1Characterization of 2-thiopyrimidine (N19Sh/N24Sh)

The N-H bond's stretch band, which appears in the region of (3325-3207) cm-1, was visible in the infrared spectrum. In addition to the sphincter (C=N) stretching, which is visible at the range of 1664–1625 cm-1, there is also the emergence of a band associated with the sphincter (C=S) stretching, which occurs at the range of (1056–1090) cm-1. Additionally, it was noted that two absorption bands resulting from the stretching of the aromatic (C=C) bond appeared in the range of (1535-1591) cm-1 and (1406-1519) cm-1; a band resulting from the stretching of the aromatic (C-H) bond appeared at (3071-3013) cm-1, and bands resulting from the stretching of the apathetic (C-H) bond appeared at (2823-2993) cm-1. Additionally, the stretching of the bond is responsible for the bands that emerge at (1201-1309) cm-1 (C-N) [14]. as shown in the table. (2)

The carbon 13C-NMR spectra revealed the emergence of a signal at site ppm (186.87) assigned to the group's carbon (C=S) and a signal at site ppm (160.75) corresponding to the carbon (C=N) in the group. The appearance of a signal at the site ppm (47.99) related to the amine group's carbon as well as a signal at the site ppm (54.74) linked to the pyrimidine group's (C-H) carbon As shown in Figure (1), in addition to signals at the ppm site (127.60-137.75), the carbon of the (3CH) group of the five-point ring connected to

the benzene ring is responsible for signals at the ppm site (32.53).[15] ascribed to signals in the ppm range (39.10–40.77) and aromatic ring carbons.[15] ascribed to the solvent's carbons (DMSO-d6)

Examining the compound's (1H-NMR) spectra (N29Sh), As illustrated in Figure (2), there are several signals that are linked to different events. A triple signal in the range of (3.32-3.35) ppm is attributed to the protonation of the aliphatic (C-H) group, while a double signal appears in the sites (3.43, 3.44) ppm attributed to the protonation of the (CH2) group, a signal appears in the site (3.91) ppm attributed to the protons of the (CH3) group, and a signal appears at location (2.47) ppm attributed to the protons of the solvent (DMSO-d6).

3.2. Evaluation of biological activity:

Using the cup agar plate diffusion technique, several of the produced compounds (N19Sh, N20Sh, N21Sh, N22Sh, N23Sh, and N24Sh) were evaluated against various strains of bacteria, including Gram-negative bacteria, Escherichia coli, and Gram-positive bacteria, Staphylococci, Staphylococcus aureus [17, 18]. After eight hours of incubation at 37°C, microbial cultures were diluted with 0.8% sterile saline. The drug solution employed in DMSO was maintained at a concentration of 100 µg/ml. A control of amoxicillin was employed[19]. The diameter of the disc's bacterial growth inhibition served as a proxy for biological activity.

Table (1): Physical properties and elemental analyiss of the prepared compounds (N19Sh / N24Sh)

Comp. No	R	m.p. °C	Yield%	Color
N19Sh	4-Br	**175-177**	**63**	Yellow
N20Sh	4- N(CH3)2	**160-162**	**59**	LightYellow
N21Sh	2,4-diCl	**158-160**	**54**	Darck Yellow
N22Sh	4-CH_3	**155-157**	**48**	LightYellow
N23Sh	4-Cl	**165-167**	**48**	LightYellow
N24Sh	4-NO2	**162-160**	**61**	Darck Yellow

Table (2): FT-IR data for the prepared compounds (N19Sh/N24Sh)

Comp. No.	R	IR (KBr) cm^{-1}						
		νNH	**ν C-H Arom.**	**ν C-H Aliph.**	**νC=N**	**ν(C=C) Arom.**	**νC-N**	Others
N19Sh	**4-Br**	**3207**	**3032**	**2923 2850**	**1647**	**1562 1481**	**1201**	ν (C-Br) 688
N20Sh	**4-N(CH_3)$_2$**	**3325**	**3013**	**2933 2815**	**1664**	**1535 1443**	**1282**	ν (C-N) 1282
N21Sh	**2,4- di Cl**	**3276**	**3029**	**2927 2858**	**1645**	**1546 1461**	**1305**	ν (C-Cl)740
N22Sh	**4-CH3**	**3298**	**3071**	**2925 2812**	**1649**	**1591 1419**	**1205**	...
N23Sh	**4-Cl**	**3225**	**3032**	**2923 2860**	**1625**	**1571 1406**	**1309**	ν (C-Cl)811
N24Sh	4-NO_2	3320	3062	2945 2825	1641	1581 1415	1218	ν (N-O)1330

Table (3): Antibacterial activity of the prepared compounds (N19Sh/N24Sh) and the control antibiotic

Comp. No	*E.Coli* mg/ml			*Staphylococcus aureus* mg/ml		
	0.01	0.001	0.0001	0.01	0.001	0.0001
N19Sh	18	12	7	16	11	9
N20Sh	11	11	6	14	12	NIZ
N21Sh	14	14	9	19	16	8
N22Sh	17	12	6	19	18	7
N23Sh	17	13	8	16	13	6
N24Sh	20	17	9	18	14	7
Amoxicillin	18	11	9	19	19	9

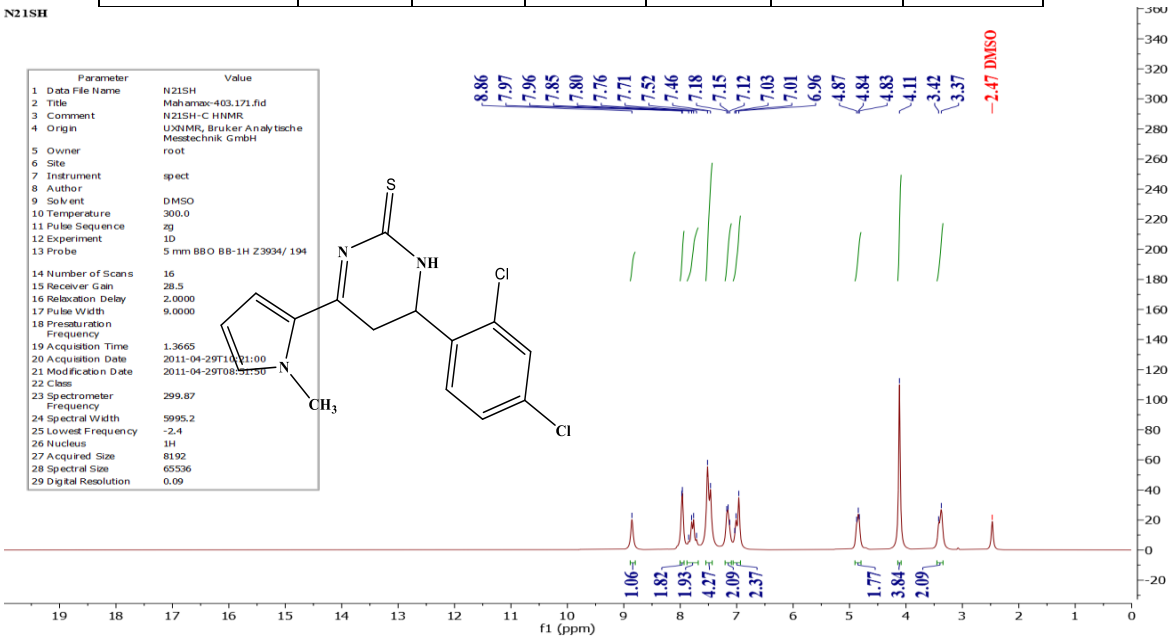


Figure (1): H-NMR spectrum of the compound (N21Sh)

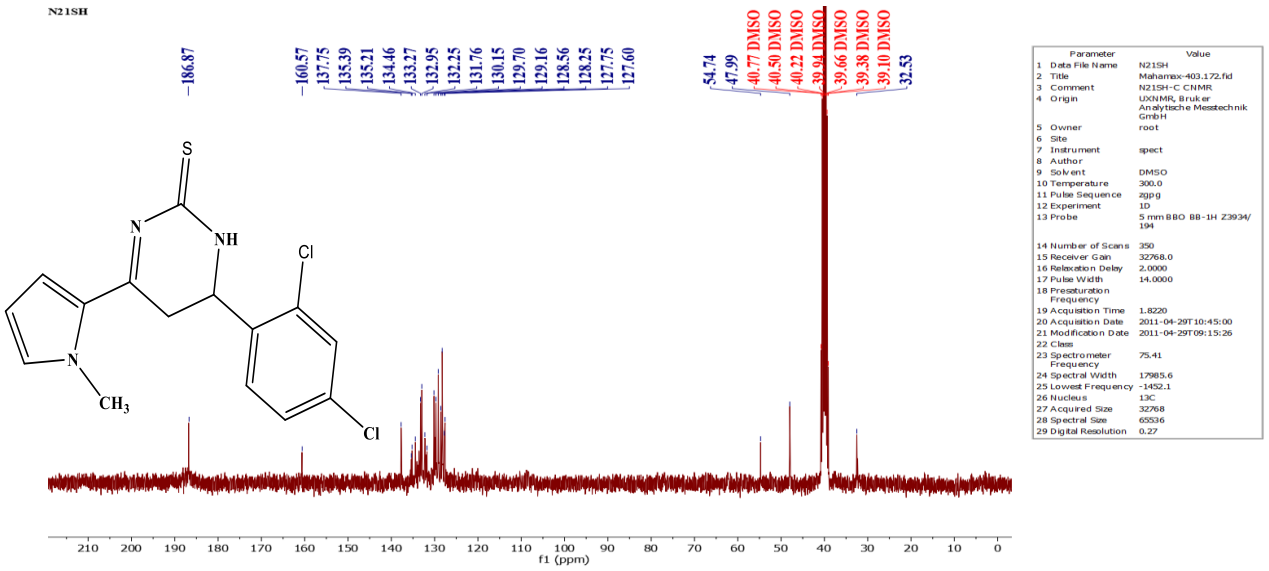


Figure (2): 13 C-NMR spectrum of the compound (N21Sh)

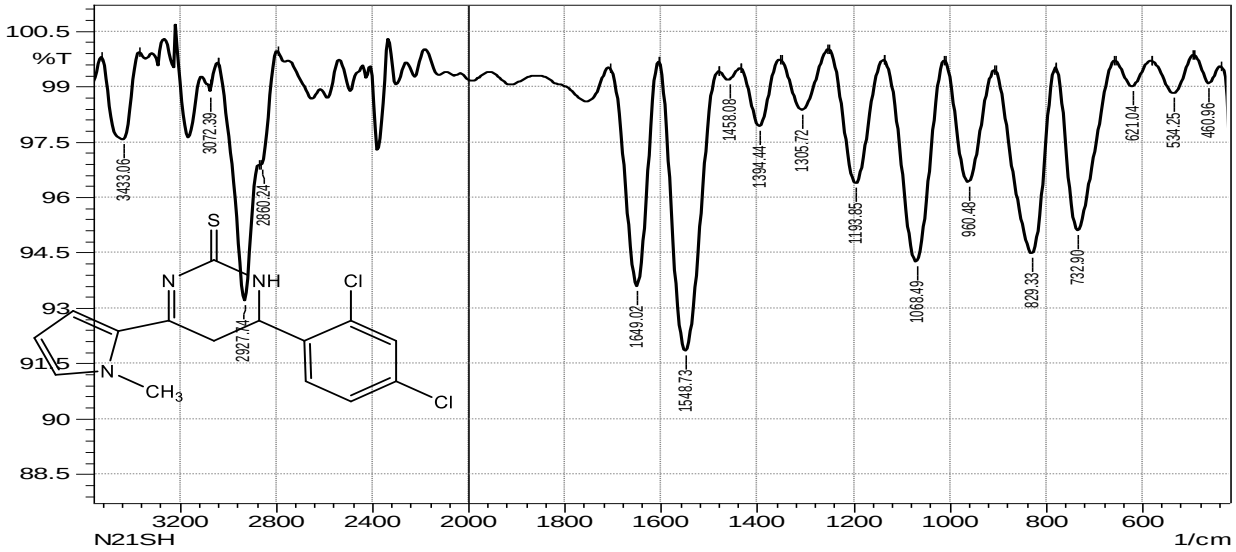


Figure (3): IR spectrum of the compound (N21Sh)

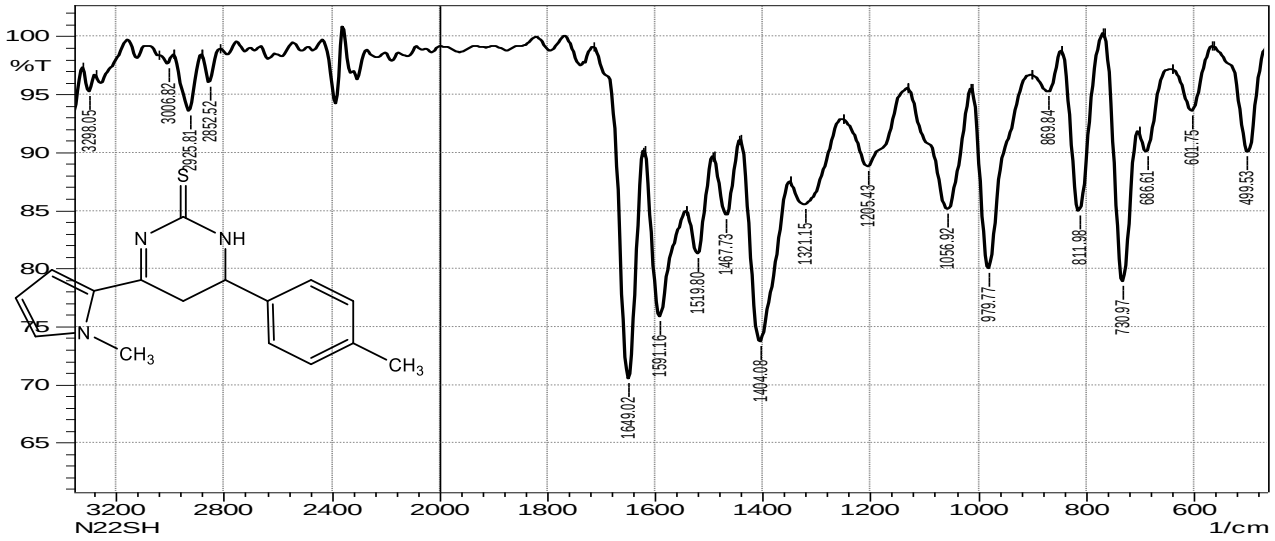


Figure (4): IR spectrum of the compound (N22Sh)

4. Conclusions: Through spectroscopic and physical measurements, the prepared compounds' validity and accuracy were verified. The presence of active aggregates was confirmed with accuracy by infrared spectra, and this confirmation was further strengthened by the proton and carbon nuclear magnetic resonance spectra, which verified the prepared compounds' structures with accuracy. These substances do not break down or change colour at laboratory temperature, and they are stable. When compared to control samples that contained antibiotics, the produced compounds demonstrated strong and effective inhibitory action against both Gram-positive and Gram-negative bacteria.

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