Al-Kufa University Journal for Biology / VOL.8/ NO.3/ Year: 2016

Print ISSN: 2073-8854 & Online ISSN: 2311-6544

Synthesis , characterization and study biological activity of some new five heterocyclic derivatives for β-D-Fructopyranose

Ezzat H. Zimam *

*Department of Chemistry, Faculty of Science / University of Kufa, Iraq

ezat_ahlam@yahoo.com

Abstract:

This research involves the synthesis of some new 1,2,3-Traizoliene and 1,2,3,4-Tetrazole derivatives. Firstly was converted 2-aminpyridine to thiazolo[4,5-b]pyridin-2-amine (A) by reacting with ammonium thiocyanate in presence of glacial acetic acid. Then, compound (B) was prepared from the reaction of (A)with p-acetamido benzenesulphonyl chloride in basic medium. Hydrolysis of compound (B) in glacial acetic acid gives compound (C).Shiff bases (1-5) were prepared by reaction of (C) with aromatic aldehydes . Compound (D) was synthesized from reaction of compound (C) with acetic anhydride in presence of Conc. H_2SO_4 . Chalcone derivatives (6-10) were prepared from reaction compound (D) with aromatic aldehyde. Finally To achieve this work , Methyl- D-fructpyranoside (E) was synthesized by treating D-Fructose with Methanol in acidic medium under thermodynamically controlled conditions to make sure that the fructopyranoside are the predominant product. The hydroxyl group on C_1 was converted into mesylester derivatives (F) by reaction (E) with one equivalent of mesylchloride at $0C^o$

The vital compound in this synthesis compound (G) was obtained by treatment (F) with one mole of sodium azide in presence of TBAB. Reaction (G)with Schiff bases gives1,2,3,4-Tetrazole derivatives (11-15),while reaction with unsaturated compound formed 1,2,3-Traizoliene derivatives (16-20) . The synthesized compounds have been measured by their melting points, and characterized by C.H.N. analysis, FT-IR and ^{1}H-MNR spectroscopy.

Keywords: Azide, Sulfonamide derivatives,1,2,3-triazoliene ,1,2,3,4-tetrazole, β- D-Fructose

Introduction:

D-fructose is the second most abundant simple sugar in nature and so is a significant component of human dietary sugar intake [(1)], and has widely derivatives especially in its furanose form [(2)].

Sulfonamide derivatives have been the subject of intensive studies, where a wide variety of those derivatives have been prepared and used in various physical, biological and pharmacological fields [(3)].Schiff bases derived from aromatic amines and aromatic aldehydes have a wide variety of applications in many fields as sulfonamide's Schiff bases have been reported to posses antimicrobial activity [(4)] , anti-inflammatory activity [(5)], anti kinetoplastid antimitotic activity [(6)] antitumor activity [(7)] and anti convulsant activity[(8)]. Small ring heterocycles containing nitrogen, sulfur and oxygen have been under investigation for a long time because of their important medicinal properties .[(9)] Also, has been reported to possess a variety of significant and diverse pharmacological activities such as antibacterial, anti consultant , anti hyperglycemic, antitumor, anti-HIV, anti-inflammatory and enzyme inhibitory activities [(10-12)]. .

Print ISSN: 2073-8854 & Online ISSN: 2311-6544

1,2,3-triazoles in the field of conformational studies has widely application as plant growth regulators[13], bactericides[14], medical fungicides[15], insecticides[16] and in dyeing and color development. [17]

1,2,3,4-Tetrazole and their derivatives possess broad spectrum of biological activity in both medicinal and pharmaceutical, such as antimicrobial [18], antibacterial, antifungal, antiviral, anti-inflammatory and anticancer [19].

In this paper, some new β-D-fructopyranoside containing 1,2,3-triazoline and 1.2.3.4-tetrazole rings at C_1 position where synthesized, and it has been considered as an interesting component in terms of biological activity [20-22].

Experimental:

Chemicals:

All chemicals were used supplied from Merck , BDH and Fluke chemicals company . The melting points were recorded using thermometer melting point apparatus, UK. The elemental analyses were recorded using E.A.G.E.R.-100, Carlo Erba, Italy. FT.IR spectra were recorded using Fourier transform infrared SHIMADZU FT.IR-8400S infrared spectrophotometer by KBr disc.^{1}H-NMR were recorded on Fourier transform Bruker spectrometer, operating at 400 MH_Z.

Methods:

Synthesis of thiazolo[4,5-b]pyridin-2-amine (A).[23]
In a (250 ml) round bottomed flask equipped with a magnetic bar stirrer and a dropping funnel, solution of bromine (1.2 ml) in glacial acetic acid(75 ml) was allowed to run through the dropping funnel drop wise during 30 min. to a mixture of 2-aminopyridine (0.03 mol) and ammonium thiocyanate (0.1 mol) in (150 ml) glacial acetic acid with stirring. The mixture was stirred for 1 hr., then diluted with water and neutralized with solid sodium hydroxide. The precipitated substance was collected and recrystallized from a suitable solvent to obtain compound (A) .

Synthesis of N-(4-(N-thiazolo[4,5-b]pyridin-2-ylsulfamoyl)phenyl)acetamide (B).[24]
Compound (A) (0.01 mol) was added in a mixture of (20 ml) of dry pyridine and (80 ml) of acetic anhydride. To this mixture, p-acetamido benzene sulphonyl chloride (0.02 mol) was added and the mixture was heated for 2 hours on a water bath. The reaction mixture was poured into crushed ice, and the precipitate obtained was filtered and recrystallized from ethanol to give white crystalline solid compound (B)

Synthesis of 4-amino-N-(thiazolo[4,5-b]pyridin-2-yl)benzenesulfonamide (C).[25]
The compound (B) (0.03 mol) was hydrolyzed by boiling with (100 ml) of glacial acetic acid for 6hours and then the reaction mixture was poured into crushed ice, precipitate obtained was filtered and recrystallized from ethanol to give white crystalline solid compound (C).

General procedure for the synthesis of Schiff bases (1-5).[26]
A mixture of equimolar quantities(0.01mol) of aromatic benzaldehyde and compound(C) was refluxed for 24 hrs in (30 ml) of absolute ethanol and glacial acetic acid . The reaction mixture was cooled and the crystals found was filtered , dried and recrystallized from ethanol to give compounds (1-5) .

Print ISSN: 2073-8854 & Online ISSN: 2311-6544

N-(4-(N-thiazolo[4,5-b]pyridin-2-ylsulfamoyl)phenyl)acetamide(D).[27]

A mixture of compound (C) (0.01 mol) and acetic anhydride (10 ml) with few drops of concentrated sulfuric acid was refluxed for 2 hours at (60-70)C^{o}. The initial content of the reaction is a suspension, then it was clear solution after the temperature reached above (60)C^{o}. Then, TLC showed that the reaction was completed by using (benzene: ethanol, 4:1). After the reaction has been completed the reaction mixture was added in to crushed ice water with stirring. The formed solid product was separated by filtration, and re crystallized from ethanol.

General procedure for synthesis chalcones. (6-10).[28]

To a stirred mixture of (0.01 mol) of (D) and(0.02 mol) of aromatic aldehydes in(25 ml) ethanol at room temperature, 40% NaOH aqueous solution was added portion-wise in ice bath after which stirring was continued for further(2-3) hr. Then, the TLC showed that the reaction was completed by using (benzene: ethanol, 4:1). The color precipitate formed was filtered and washed with 3% aqueous HCl ,then with distilled water and re crystallized from ethanol.

Methyl β-D-Fructopyranoside (E). [29]

(7.5 gm) D- Fructose is dissolved in 0.5% HCl (generated by dissolving 1ml Acetyl Chloride in 106ml absolute Methanol). Reflex under(70 – 80) C^{o} for 3hrs. then poured evaporated under vacuum gives (syrup) T.L.C (Benzene : Methanol) (4:1) showed that the reaction was completed

Methyl –1–O –methyl sulphonyl β-D-Fructopyranoside (F). [29]

To a solution of compound (E) (5 gm) in (20ml) pyridine Mesylchloride (1.3ml) was added drop wise. At 0C^{o} the reaction mixture was left overnight, then poured in to Ice-cold water and then extracted with chloroform, evaporated under vacuum to give (syrup) T.L.C (Benzene : Methanol) (4:1) showed that the reaction was completed.

Methyl –1–Azido β-D-Fructopyranoside (G). [29]

(4 gm) of compound (F) dissolved in (20)ml DMF, then (1.095) sodium azide with (0.4 gm) TBAB were added. Reflex under 110 – 120 C^{o} for 24hr. poured in to Ice – Cold water and then extracted with chloroform, evaporated under vacuum to give syrup T.L.C (Benzene : Methanol) (4:1) showed that the reaction was completed.

General procedure for synthesis 1,2,3-triazoline derivatives (11-15).[30]

Methyl –1–Azido –β–D–Fructopyranoside [G] (0.01mol) was dissolved in DMF (50ml). The α,β-unsaturated compounds (0.01 mol) was added to the solution. The mixture was heated under reflux at 110 ^{o}C for 24 hrs. After removing the solvent, the residue was washed with diethyl ether and re-crystallized from ethanol. TLC showed that the reaction was completed by using (benzene : methanol, 4:1).

Print ISSN: 2073-8854 & Online ISSN: 2311-6544

General procedure for synthesis of 1,2,3,4-tetrazoline derivatives (16-20).[30]

(0.01mol) of appropriate Schiff base was dissolved in (25 ml) of DMF and to that (0.01mol) of Methyl –1–Azido –β–D–Fructopyranoside [G] was added and the resultant reaction mixture was heated to 125 ^{o}C for (24 hrs.). The solvent was partially evaporated. Finally, the contents were filtered, dried and The TLC showed that the reaction was completed by using (benzene: methanol) (4:1).

Test of Biological Activity of Chemical Compounds Prepared:

By using Toda's [31] method for the test of biological activity of chemical compounds prepared which includes the following steps:

1- Prepare bacterial suspension from used bacteria (***Staphylococcus arueus*** and ***Escherichia coli***) and compare with McFarland tube 1.5× 108 cell /ml.

2- Spread bacterial suspension on (Muller Hinton Agar) homogeneously (0.1 ml) to cover the whole medium.

3- Make holes in the paten dish by the cork piercing to diameter 6 mm at concentration used.

4- Prepare dilute solutions (30, 60) mg/ml for each compound at physiological pH (7).

5- Put the prepared concentrated solutions from chemical compounds in holes to know their effectiveness for biological activity.

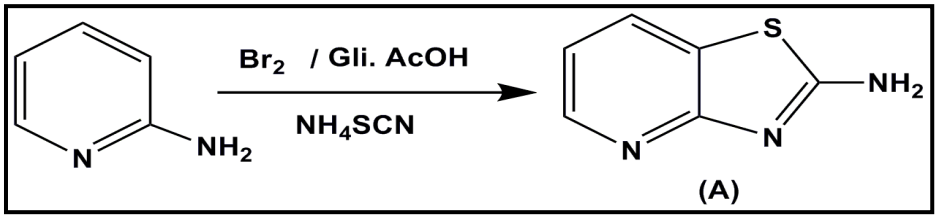
5- Incubate the paten dish at temperature 37 ^{o}C for 24 hours.

6- Measure the diameter of inhibition zone for each disc by the ruler to determine the effectiveness of each compound and compare with the standard limits of sensitivity of the same species of bacteria against antibiotics.

Results and Discussion:

Synthesis of thiazolo[4,5-b]pyridin-2-amine (A).

The compound (A) was prepared first by the condensation of 2-aminopyridine with ammonium thiocyanate in the presence of bromine in glacial acetic acid .



The synthesized compound (A) was characterized by [C.H.N.S.] analysis, and the result of experimental percentages was a good agreement with the calculated percentages of elements shown in Table [1]. This is a good evidence for formatting our compounds . The FT-IR spectra of this compound showed appearance of two absorption bands at (3420) cm^{-1} and (3350) cm^{-1} of the

Print ISSN: 2073-8854 & Online ISSN: 2311-6544

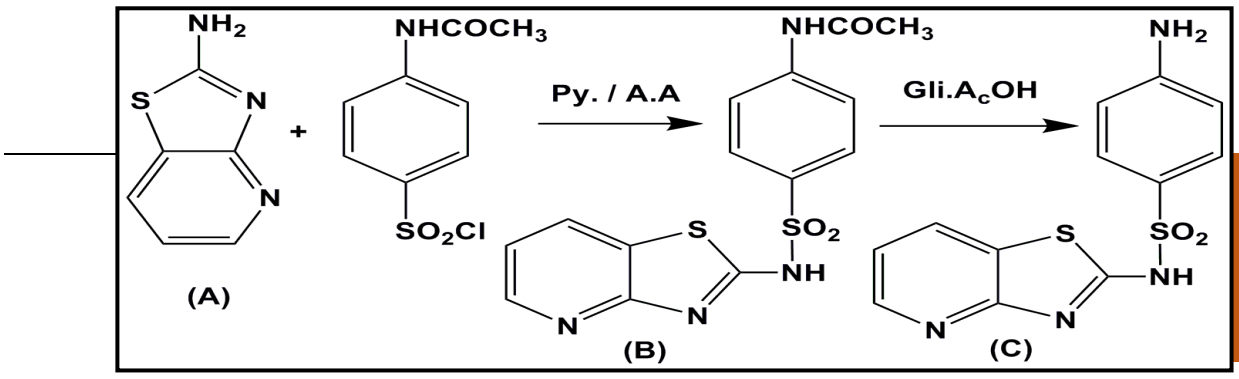
asymmetric and symmetric stretching vibrations of (-NH_2) group and absorption band at (1555) cm^{-1} of the stretching vibration of (C=N) group of (hetero aromatic ring) of pyrimidine[29] as well as the stretching vibration of (C-S) at (840) cm^{-1}. All of these absorption bands are good evidence to the formation of compound (A).^{1}H-NMR spectrum (δ ppm), (DMSO- d_6) showed (Ar-H) (7.34-8.43), (2H) (NH_2) (6.93).

Table(1) [C.H.N.S] analysis data and some physical properties of synthesized comp. (A).

Com. No.	Chemical Formula	C.H.N.S. data Calculated / Found				M.P. ^{0}C	Yield %	R_f
		C%	H%	N%	S%			
A	$C_6H_5N_3S$	47.66 47.52	3.33 3.28	27.79 27.56	21.21 20.95	155-156	77	0.75

compound (B) N-(4-(N-thiazolo[4,5-b]pyridin-2-ylsulfamoyl)phenyl)acetamide was prepared from the reaction of (A) with p-acetamido benzenesulphonyl chloride in basic medium .The FT-IR spectra of compound(B) showed disappearance of two absorption bands of the asymmetric and symmetric stretching vibrations of (-NH_2) group of compound (A) and appearance of the band between (1665) cm^{-1} of stretching vibration of (C=O) carbonyl group and absorption band at (3310) cm^{-1} due to a stretching vibration of (N-H) secondary sulfonamide, and the asymmetric(1336) cm^{-1} and symmetric (1155) cm^{-1} stretching vibrations of (-SO_2) group. [C.H.N.S.] analysis, gives good agreement result between experimental and calculated percentages of elements. ^{1}H-NMR spectrum (δ ppm), (DMSO-d_6) showed ((3H) (N-COC<u>H</u>$_3$) 2.04) , (Ar-<u>H</u>) (7.46-8.42), (1H) (N-<u>H</u>)$_{sulfonamide}$ (11.21) ,(1H) (N-<u>H</u>)$_{amide}$ (10.28).

Then hydrolyzed compound (B)with glacial acetic acid to form compound (C) 4-amino-N-(thiazolo[4,5-b]pyridin-2-yl)benzenesulfonamide. The FT-IR spectra of compound(C) showed appearance of two absorption bands at (3425) cm^{-1} and (3353) cm^{-1} of the asymmetric and symmetric stretching vibrations of (-NH_2) group and disappearance of of (C=O) carbonyl group and absorption band at (3310) cm^{-1} due to a stretching vibration of (N-H) secondary sulfonamide as well as the asymmetric (1335) cm^{-1} and symmetric (1150) cm^{-1} stretching vibrations of (-SO_2) group . [C.H.N.S.] analysis, gives good agreement result between experimental and calculated percentages of elements. ^{1}H-NMR spectrum (δ ppm), (DMSO- d_6) showed ((3H) (N-COC<u>H</u>$_3$) 2.12) , (Ar-<u>H</u>) (7.35-8.34), (1H) (N-<u>H</u>)$_{sulfonamide}$ (11.16) ,(1H) (N-<u>H</u>)$_{amide}$ (10.14).



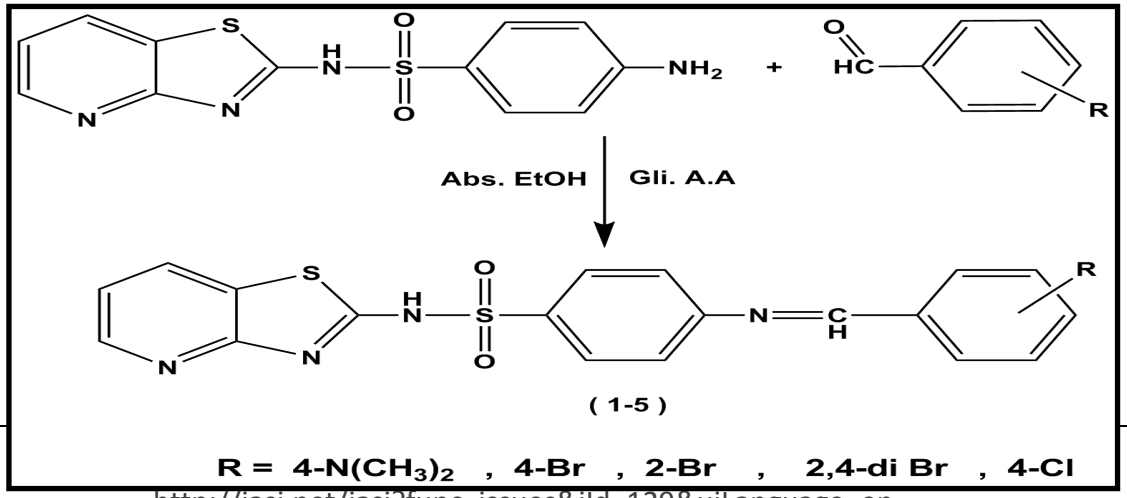
Al-Kufa University Journal for Biology / VOL.8/ NO.3/ Year: 2016

Print ISSN: 2073-8854 & Online ISSN: 2311-6544

Table(2) [C.H.N.S] analysis data and some physical properties of synthesized comps. (B)&(C).

Comp. No.	Chemical Formula	C.H.N.S. data Calculated / Found				M.P. ^{0}C	Yield %	R_f
		C%	H%	N%	S%			
B	$C_{14}H_{12}N_4O_3S_2$	48.26 48.17	3.47 3.25	16.08 15.86	18.41 18.31	182-183	84	0.72
C	$C_{12}H_{10}N_4O_2S_2$	47.04 46.96	3.29 3.26	18.29 18.17	20.93 20.87	174-175	82	0.68

Schiff bases (1-5) were prepared by reaction of compound (C) with aromatic aldehydes in the presence of glacial acetic acid to form :- 4-(4-(dimethylamino)benzylideneamino)-N-(thiazolo[4,5-b]pyridin-2-yl)benzenesulfonamide **(1)** , 4-(4-bromobenzylideneamino)-N-(thiazolo[4,5-b]pyridin-2-yl)benzenesulfonamide **(2)** , 4-(2-bromobenzylideneamino)-N-(thiazolo[4,5-b]pyridin-2-yl)benzenesulfonamide **(3)** , 4-(2,4-dibromobenzylideneamino)-N-(thiazolo[4,5-b]pyridin-2-yl)benzenesulfonamide **(4)** and 4-(4-chlorobenzylideneamino)-N-(thiazolo[4,5-b]pyridin-2-yl)benzenesulfonamide **(5) .**



Print ISSN: 2073-8854 & Online ISSN: 2311-6544

The FT-IR spectra of Schiff bases showed disappearance of two absorption bands of the asymmetric and symmetric stretching vibrations of (-NH_2) group and appearance of the band between (1600-1645) cm^{-1} of stretching vibration of (C=N) group and absorption band at (3315) cm^{-1} due to a stretching vibration of (N-H) secondary sulfonamide, and the asymmetric(1330) cm^{-1} and symmetric (1150) cm^{-1} stretching vibrations of (-SO_2) group. [C.H.N.S.] analysis, gives good agreement result between experimental and calculated percentages of elements table [3]. ^{1}H-NMR spectrum (δ ppm), (DMSO- d_6) showed ((3H) (N-COC$\underline{H}_3$) 2.04) , (Ar-$\underline{H}$) (7.25-8.35), (1H) (N-$\underline{H}$)$_{sulfonamide}$ (11.28) ,(1H) (N=C$\underline{H}$) $_{Imine}$ (8.75). ((6H) (N-(C$\underline{H}_3$)$_2$ 3.32) for compound (1).

Compound (D) N-(4-(N-thiazolo[4,5-b]pyridin-2-ylsulfamoyl)phenyl)acetamide was prepared from reaction compound (C) with acetic anhydride in presence of Conc.H_2SO_4 The FT-IR spectra showed disappearance of two absorption bands of the asymmetric and symmetric stretching vibrations of (-NH_2) group and appearance of the band between (1710-1715) cm^{-1} of stretching vibration of (C=O)Amide group and absorption band at (3315) cm^{-1} due to a stretching vibration of (N-H) secondary sulfonamide, and the asymmetric(1335) cm^{-1} and symmetric (1155) cm^{-1} stretching vibrations of (-SO_2) group. [C.H.N.S.] analysis, gives good agreement result between experimental and calculated percentages of elements table [3]. ^{1}H-NMR spectrum (δ ppm), (DMSO- d_6) showed ((3H) (N-COC$\underline{H}_3$) 2.04) , (Ar-$\underline{H}$) (7.25-8.35), (1H) (N-$\underline{H}$)$_{sulfonamide}$ (11.28) .

Table (3) [C.H.N.S] analysis data and some physical properties of synthesized comps. (1-5).

Comp. No.	Chemical Formula	C.H.N.S. data Calculated / Found				M.P. ^{0}C	Yield %	R_f
		C%	H%	N%	S%			
1	**$C_{21}H_{19}N_5O_2S_2$**	57.65 57.58	4.38 4.34	16.01 15.94	14.66 14.57	232-233	87	0.72
2	**$C_{19}H_{13}BrN_4O_2S_2$**	48.21 48.15	2.77 2.64	11.84 11.75	13.55 13.52	248-249	88	0.65
3	**$C_{19}H_{13}BrN_4O_2S_2$**	48.21 48.15	2.77 2.64	11.84 11.75	13.55 13.52	256-257	87	0.7
4	**$C_{19}H_{12}Br_2N_4O_2S_2$**	41.32	2.19	10.14	11.61	266-267	85	0.62

Print ISSN: 2073-8854 & Online ISSN: 2311-6544

		41.27	2.12	10.11	11.57			
5	$C_{19}H_{13}ClN_4O_2S_2$	53.20 53.16	3.05 2.94	13.06 13.01	14.95 14.88	271-272	88	0.67

Chalcone derivatives (6-10) were synthesized from reaction compound (D) with aromatic aldehydes in basic medium to form :-

3-(4-dimethylamino)phenyl)-N-(4-(N-thiazolo[4,5-b]pyridin-2-ylsulfamoyl)phenyl)acrylamide **(6)** , 3-(4-bromophenyl)-N-(4-(N-thiazolo[4,5-b]pyridin-2-ylsulfamoyl)phenyl)acrylamide **(7)** , 3-(2-bromophenyl)-N-(4-(N-thiazolo[4,5-b]pyridin-2-ylsulfamoyl)phenyl)acrylamide **(8)** 3-(2,4-dibromophenyl)-N-(4-(N-thiazolo[4,5-b]pyridin-2-ylsulfamoyl)phenyl)acrylamide **(9)** , 3-(4-chlorophenyl)-N-(4-(N-thiazolo[4,5-b]pyridin-2-ylsulfamoyl)phenyl)acrylamide **(10)** .

.

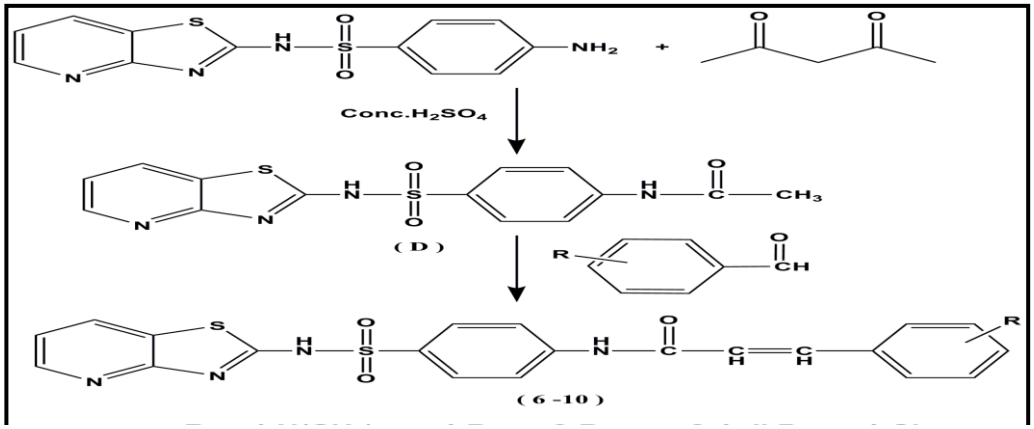


Table 4: [C.H.N.S] analysis data and some physical properties of synthesized comps. (6-10).

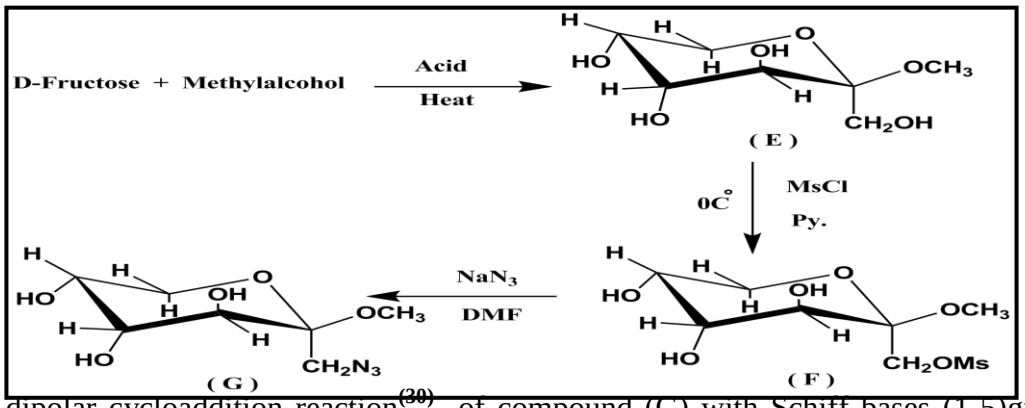
Com. No.	Chemical Formula	C.H.N.S. data Calculated Found				M.P. ^{0}C	Yield %	R_f
		C%	H%	N%	S%			
6	$C_{23}H_{21}N_5O_3S_2$	57.605 7.53	4.41 4.33	14.60 14.54	13.371 4.33	242-243	88	0.58
7	$C_{21}H_{15}BrN_4O_3S_2$	48.944 8.88	2.93 2.91	10.87 10.75	12.44 12.38	247-248	87	0.65
8	$C_{21}H_{15}BrN_4O_3S_2$	48.944	2.93	10.87	12.44	257-258	87	0.7

Print ISSN: 2073-8854 & Online ISSN: 2311-6544

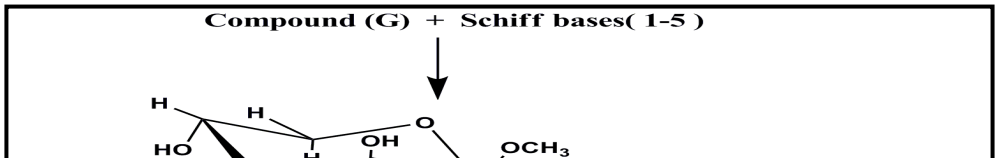
		8.89	2.90	10.76	12.37			
9	$C_{21}H_{14}Br_2N_4O_3S_2$	42.444 2.23	2.37 2.32	9.439 .28	10.791 0.65	261-262	89	0.62
10	$C_{21}H_{15}ClN_4O_3S_2$	53.565 3.52	3.21 3.18	11.90 11.87	13.621 3.54	268-269	85	0.67

The objective of this work is the synthesis of some new β–D–fructopyranoside containing 1,2,3-triazoline &1,2,3,4-tetrazole rings at C_1 position derivatives in their structures. These compounds may have biological effects beside being prepared for the first time.

First compound(E) was synthesized by treating D- fructose with methanol in presence of acid under thermodynamically controlled conditions to form fructopyranoside as a predominant product [30] . The structure of which was assigned from the FT-IR spectrum which showed strong absorption for (C-O) glycoside at (1000-1100)cm^{-1} and (-OH) at (3000-3500) cm^{-1}. Elementary analysis showed good agreement of the calculated and found percentages . The hydroxyl group on C_1 was converted into mesylester (F) by treated (E) with one equivalent of mesylchloride at $0C^o$, FT-IR spectrum showed weak band of hydroxyl , as well as (- SO_2) (1180, 1350) $cm^{-1}$with (C-O) glycoside at (1000-1100)cm^{-1}. C.H.N.S analysis (the percentages of found agreement with calculated) The vital compound in this synthesis compound (F) was obtained by treatment of (F) with one mole of sodium azide in presence of TBAB, the structure of which was assigned from I.R spectrum which showed a strong absorption at (2100)cm^{-1} of (-N_3) and disappear bands of (-SO_2). Elementary analysis showed good agreement of the calculated and found percentages and ^{1}H-NMR spectrum (δ ppm), (DMSO- d_6) showed (-CH_3) glycoside at δ(3.3)ppm , (CH_2-N_3) δ(2.9)ppm , (C-H) of sugar ring δ(3.4-3.6)ppm , (CH_2) of sugar ring δ(3.8)ppm and(OH) δ(4.6-4.8)ppm .



The (1,3) dipolar cycloaddition reaction[30] of compound (G) with Schiff bases (1-5)gives 1,2,3,4-tetrazole derivatives :- Methyl-1-[-4-(5-(4-(dimethylamino)phenyl)-2,5-dihydro-1H-tetrazol-1-yl)-N-(thiazolo[4,5-b]pyridin-2-yl)benzenesulfonamide]– β–D–fructopyranoside (11), Methyl-1-[-4-(5-(4-bromophenyl)-2,5-dihydro-1H-tetrazol-1-yl)-N-(thiazolo[4,5-b]pyridin-2-yl)benzenesulfonamide]– β–D–fructopyranoside (12), Methyl-1-[-4-(5-(2-bromophenyl)-2,5-dihydro-1H-tetrazol-1-yl)-N-(thiazolo[4,5-b]pyridin-2-yl)benzenesulfonamide]– β–D–fructopyranoside (13), Methyl-1-[-4-(5-(2,4-dibromophenyl)-2,5-dihydro-1H-tetrazol-1-yl)-N-(thiazolo[4,5-b]pyridin-2-yl)benzenesulfonamide]–



Print ISSN: 2073-8854 & Online ISSN: 2311-6544

β–D–fructopyranoside (14), Methyl-1-[-4-(5-(4-chlorophenyl)-2,5-dihydro-1H-tetrazol-1-yl)-N-(thiazolo[4,5-b]pyridin-2-yl)benzenesulfonamide]– β–D–fructopyranoside (15).

The FT-IR spectra of compounds(11-15) showed disappearance of absorption bands of the ($-N_3$) group and disappearance of the band mesyl ester of stretchingand vibration of (C=N) group and gives absorption band at (1450) cm^{-1} due to a stretching vibration of (N=N) secondary sulfonamide, and the asymmetric(1330) cm^{-1} and symmetric and the asymmetric(1335) cm^{-1} and symmetric (1155) cm^{-1} stretching vibrations of ($-SO_2$) group. [C.H.N.S.] analysis, gives good agreement result between experimental and calculated percentages of elements table. ^{1}H-NMR spectrum (δ ppm), (DMSO- d_6) showed ((3H) (-OC<u>H</u>$_3$) 3.34) , (Ar-<u>H</u>) (6.65-8.43), (1H) (N-<u>H</u>)$_{sulfonamide}$ (11.32) ,(1H) (-C<u>H</u>) $_{tetrazole}$ (4.62) ,(2H) (-C<u>H</u>$_2$ (3.65)), (-OH) δ(4.7-4.8), ((6H) (N-(C<u>H</u>$_3$)$_2$ 3.11) for compound (11).

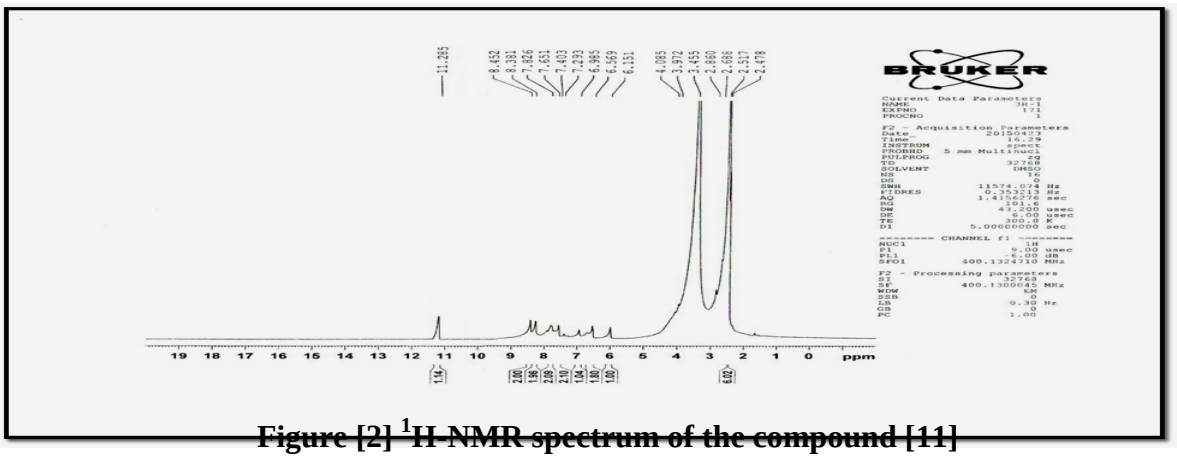


Figure [2] ^{1}H-NMR spectrum of the compound [11]

Also (1,3) dipolar cycloaddition reaction[(0)] of compound (G) with Chalcones (6-10)gives 1,2,3, triazoline derivatives :- Methyl-1-[-4-(5-(4-(dimethylamino)phenyl)- 4,5-dihydro-1H-1,2,3-triazole-5-carbonyl)--N-(thiazolo[4,5-b]pyridin-2-yl)benzenesulfonamide]–β–D–fructopyranoside (16), Methyl-1-[-4-(5-(4-bromophenyl)- 4,5-dihydro-1H-1,2,3-triazole-5-carbonyl)--N-(thiazolo[4,5-b]pyridin-2-yl)benzenesulfonamide]– β–D–fructopyranoside (17), Methyl-1-[-4-(5-(2-bromophenyl)- 4,5-dihydro-1H-1,2,3-triazole-5-carbonyl)- N-(thiazolo[4,5-b]pyridin-2-yl)benzenesulfonamide]– β–D–fructopyranoside (18), Methyl-1-[-4-(5-(2,4-dibromophenyl)-4,5-dihydro-1H-1,2,3-triazole-5-carbonyl)-N-(thiazolo[4,5-b]pyridin-2-yl)benzenesulfonamide]– β–D–fructopyranoside (19), Methyl-1-[-4-(5-(4-chlorophenyl)- 4,5-dihydro-1H-1,2,3-triazole-5-carbonyl)-N-(thiazolo[4,5-b]pyridin-2-

Print ISSN: 2073-8854 & Online ISSN: 2311-6544

yl)benzenesulfonamide]– β–D–fructopyranoside (20).The FT-IR spectra of compounds(16-20) showed disappearance of absorption bands of the ($-N_3$) group and disappearance of the band mesyl ester and stretching vibration of (C=N) group and gives absorption band at (1455) cm^{-1} due to a stretching vibration of (N=N) secondary sulfonamide, and the asymmetric(1335) cm^{-1} and symmetric and the asymmetric(1330) cm^{-1} and symmetric (1155) cm^{-1} stretching vibrations of ($-SO_2$) group and appearance of the band between (1610-1635) cm^{-1} of stretching vibration of (C=O) group. [C.H.N.S.] analysis, gives good agreement result between experimental and calculated percentages of elements table. ^{1}H-NMR spectrum (δ ppm), (DMSO- d_6) showed ((3H) ($-OC\underline{H}_3$) 3.33) , (Ar-H) (7.15-8.43), (1H) ($N-\underline{H})_{sulfonamide}$ (11.35) ,(1H), ($-C\underline{H})_{triazole}$ (4.52) , ($-C\underline{H})_{triazole}$ (6.22) (2H), ($-C\underline{H}_2$ (3.65)), (-OH) δ(4.6-4.8), ((6H) ($N-(C\underline{H}_3)_2$ 3.00) for compound (16).

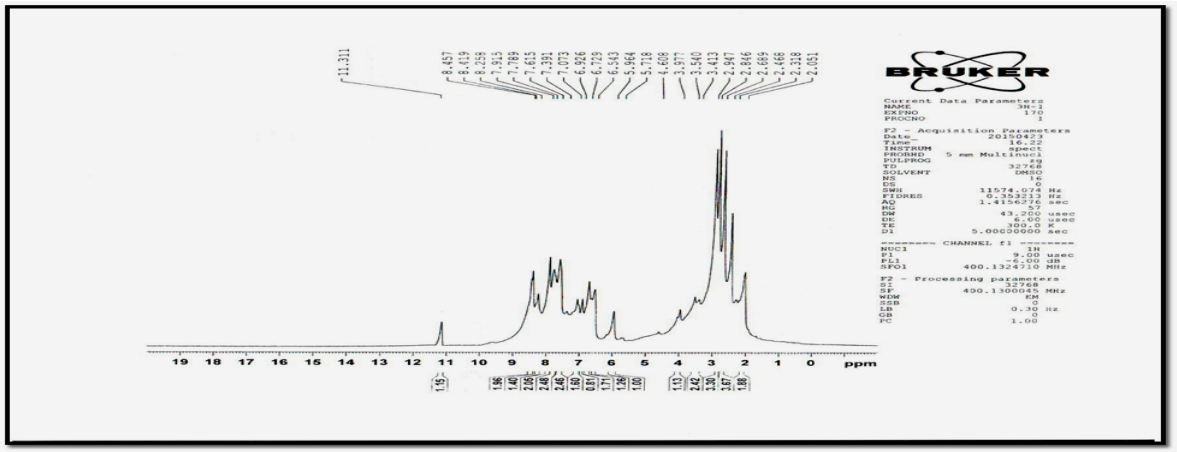


Figure [2] ^{1}H-NMR spectrum of the compound [16]

Biological activity:

The prepared compounds **[11, 12, 14, 16,18 and 20]** were examined for antibacterial activity against ***Staphylococcus aureous*** (Gram-positive) and ***Escherichia coli*** (Gram-negative) by well diffusion method in Mueller-Hinton agar medium.After 24 hours were measured for zone of inhibition around each disc. The test results presented in **Table [5]** showed that **[14]** was exhibited slightly active against ***S. aureous*** at (30mg) and was exhibited moderately active at (60mg), while was exhibited highly active against ***E.coli*** at (30mg, 60mg).

Compound **[12]** was exhibited moderately active against ***S. aureous*** at (30mg, 60mg), while was exhibited slightly active against ***E.coli*** at (30mg) and was exhibited moderately active at (60mg), Compound **[18]** was moderately active against ***S. aureous*** at (30mg, 60mg), while was exhibited highly active against ***E. coli*** at (30mg) and exhibited more highly active at (60mg), while the other compounds were exhibited moderately active against ***S. aureous*** at (30mg, 60mg) and ***E. coli*** at (30mg),but highly active at (60mg).

Table (5) Antibacterial activity of some synthesized compounds:

Print ISSN: 2073-8854 & Online ISSN: 2311-6544

Comp. NO.	Zone of inhibition in mm			
	Staphylococcus aureous (Gram-positive)		*Escherichia coli* (Gram-negative)	
	30 mg	**60 mg**	**30 mg**	**60 mg**
11	12 mm	16 mm	22 mm	26 mm
12	14 mm	17 mm	12 mm	15 mm
14	11 mm	15 mm	17 mm	28 mm
16	13 mm	15 mm	18 mm	25 mm
18	12 mm	16 mm	19 mm	27 mm
20	13 mm	16 mm	20 mm	25 mm

Refrences:

(1) Wright, E. M. (special issue). Am. J. Physiol, 38, G879-G882,(1998).
(2) Ezzat H. Zimam , Ph.D Thesis , Baghdad university , (2006).
(3) J. S. Hadi, B. K. Al-Salami and A. H. Essa ; J. Sci. Res.; 1 (3), 563- 568 , (2009) .
(4) A. D Manikpuri.; Res. J. of Pharm. Biol. and Chem.Sci.; 1(2) , 21-27, (2010) .
(5) A.Zarghi, T . Zebardast, F. Hakimion, F. H.Shirazi , P.N.P. RaO and E.E. Knaus, ; Bioorg. and Med.Chem.; 14 (20), 7044-7050, (2006) .
(6) T.G.George, J. Johnsamuel, D. A Delfin., M. Y. A.,Mukherjee., M.A. Phelps., J. T.Dalton , D.l. Sackett, M.Kaiser, R.Brun and K. A. Werbovetz.; Bioorg. and Med.Chem,14 (16) , 5699-5710, (2006).

(7) M. M. Kamel, H. I. Ali , M.M. Anwar , N.A. Mohamed and A. M. Soliman; Eur. J. of Med.Chem.,45 (2), 572-580 ,(2010).
(8) N. Siddiqui, S. N.Pandeya, S.A.Khan, S. James, A. Rana,and A.Mahfouz; BioOrg. and Med. Chem. Lett, 17, 225-259, (2007).
(9) Z. Turgut, C. Yolacan, F. Aydogan, E. Bagdatli and N. Ocal , Molecules ,12 , 2151, (2007).
(10) G.S. Singh, T Singh and L. Lakhan, , Indian J. Chem. , 36B, 951-954, (1997).
(11) R.H. Udupi, N. Kasinath and A.R. Bhat, , Indian J. Het. Chem. , 7, 221-224, (1998).
(12) A.S. Gajare, S.B. Bhawsar, D.B. Shinde, M.S. Shingare, Indian J. Chem, , 36B, 449-452, (1997).
(13) Garanti, L.; Molteni, G. *Tetrahedron Lett.*, *44*, 1133-1135, (2003) .
(14) Molteni, G.; Buttero, P.D. *Tetrahedron*, *61*, 4983-4987, (2005)
(15) Alvarez, R.; Velazquez, S.; San, F.; Aquaro, S.; De, C.; Perno, C.; Karlsson, A.; Balzarini, J.; Camarasa, J.M. *J. Med. Chem.*, *37*, 4285, (1994) .
(16) Avat Arman Taherpour , and Mehrak Faraji , *Molbank*, M577,(2008)
(17) Velazquez, S.; Alvarez, R.; Perez, C.; Gago, F.; De, C.; Balzarini, J.; Camarasa, M.J. *Antivir. Chem Chemoter.*, *9*, 481, (1998).
(18) Bhaskar V.H.,Mohite P.B.,Pandhare R.B. and Khanage S.G. *Acta pharm.sci*,52,p. 504 (2010).

Print ISSN: 2073-8854 & Online ISSN: 2311-6544

(19) Mamdouh A. Sofan, Samy B. Said , Said H. Kandeel; *Der Pharma Chemica*, 4 (3), p.1064-1073(2012).
(20) Giguère, D.; Patnam, R.; Bellefleur, M. A.; St-Pierre, C.; Sato, S.; Roy, R. *Chem. Commun.*, 2379–2381,(2006).
(21) Whitting, M.; Muldoon, J.; Lin, Y.-C.; Silverman, S. M.; Lindstrom, W.; Olson, A. J.; Kolb, H. C.; Finn, M. G.; Sharpless, K. B.; Elder, J. H.; Fokin, V. V. *Angew. Chem., Int. Ed., 45*, 1435–1439,(2006).
S. Holla, B. S.; Mahalinga, M.; Karthikeyan, M. S.; Poojary, B.; Akberali, P. M.; (22) Kumari, N. S. *Eur. J. Med. Chem., 40*, 1173–1178,(2005).
(23) N. B. Patel and S. N. Agravat , Orient J. Chem. , 22(2), 333, (2006).
(24) A. K. Sandeep and P. Devendra , Int. J. of Pharm. Tech, Res. , 3(4) , 2104-2110, (2011)
(25) A. I. Vogel , A Textbook of Practical Organic Chemistry, 4th ed., 652 -653,(1978).
(26) M. Reza , M. Tavakoli and S. Riahi , J. Electrochem. Sci. , 3, 1559 , (2008).
(27) Bhuiyan M.M.H. , Hossain M.I., Mahmud M.M. and Mohammad Al-Amin; *Chemistry Journal* , Vol. 01, 01, p. 21-28 (2011).
(28) Ahmed W. Radhy and Ezzat H. Zimam , AL-Qadisiyha Journal For Science Vol.19 No. 3 (2014).
(29) Ezzat H. Zimam , MSc. Thesis , Babylon university , (2000).
(30) Ezzat H. Zimam ,International Journal of Chemical and Natural Sciences , Vol. 2 ,No.4(109-115) (2014).
(31) Ego rove. N. S., *Antibiotics Scientific Approach . Mir publishers.* Moscow., (1985).