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SYNTHESIS AND CHARACTERIZE NEW HETEROCYCLIC COMPOUNDS DERIVATIVES FROM DIAZONIUM SALT DERIVATIVES

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ABSTRACT

Diazonium salts[1,2] were synthesized by the reaction of salicyldehyde with different primary amine. And then refluxed compounds[1,2] with appropriate amine to form Schiff Bases derivatives.[3-6] New derivatives of β-lactam[7-10] were synthesized by the reaction of Schiff Bases derivatives[3-6] with chloroacetyl chloride in presence triethylamine. Then cyclization of compounds[3-6] with mercapto acetic acid in presence dry benzene to give thiazolidenones derivatives.[11-14] All synthesized compounds were characterized by measurement melting point, FT-IR spectral, Elemental Analysis and some of them by ^{1}H-NMR spectral.

KEYWORD: Diazonium salt, Schiff base, β-lactam, Thiazolidenone.

INTRODUCTION

Azo dyes compounds are contain Nitrogen-Nitrogen group as a characteristic chromophore, and mainly give in diazotization and coupling reaction. As per literature survey, it was occur that azo dyes have been most vastly used in variety application fields, such as dying textile fibres, biomedical studies and advanced in organic synthesis as well as shows different of attenting biological activities consisting antibacterial and pesticide activities.[1-5] azo dye compounds are recognized for their medicinal importance[6–9], azo compounds are recognized to be related in a number of biological reactions illustrate inhibition of DNA, RNA and protein synthesis, carcinogenesis and nitrogen fixation.[10]

A β-lactam (beta-lactam) ring, is a four-membered lactam. (A lactam is a cyclic amide.) It is named as such, because the nitrogen atom is attached to the β-carbon relative to the carbonyl. The simplest β-lactam possible is 2-azetidinone. Schiff bases on cyclocondensation reaction with chloroacetyl chloride afforded a biologically active 2-azetidinones derivatives.[11] All the test compounds (Beta lactam derivatives) were screened for their in vitro antibacterial activity by agar-well diffusion method against Gram +ve (*Staphylococcus aureus, Bacillus subtilis*) & Gram –ve.[12-13]

EXPERIMENTAL

The melting points were determined in open capillary tubes on a Gallen Kamp melting point apparatus and were uncorrected .The FT.IR Spectra of prepared derivatives were taken on Shimadzu-2N,FTIR-8400S ,Elemental Analysis %,.^{1}H-NMR Spectra of some prepared derivatives were recorded on a Varian-Mercury 300MHZ Spectrometer, d_6-DMSO use as a solvent in^{1}H-NMR Spectra.

Preparation of diazonium salt[1,2]

Different primary amines (aniline or p-aminoacetophenone) (0.01 mol) are added to a solution of water (4 ml) and concentrated hydrochloric acid (2.25 ml). The resulting solution is stirred for 10 min. before being cold to (0-5) 0C. A solution of sodium nitrite (0.011 moles, 0.76 gm) in water (2.5 ml) is added drop wise. After being stirred for 10 min., the resulting solution of diazonium salt was added dropwise to a mixture of salicylaldehyde (1.22, 0.01 mol) in ethanol and 10% NaOH (10 ml) at 0C$^\circ$ -5C$^\circ$ and PH=5.5. After the addition was completed, the mixture was stirred for further 20 min. then was left for 1 hour; the resulting solid was filtered and washed with water, dried and recrystallized from ethanol.

General procedure of Schiff's base[3-6]

To a stirring solution of compound (1) or (2) (0.01mole) in absolute ethanol (15ml), the appropriated different primary amines (aniline or o-toluidine) (0.01mole) was added, and then the mixture was refluxed 6hrs. Cooled at room temperature the precipitate was filtered and recrystallized from ethanol.

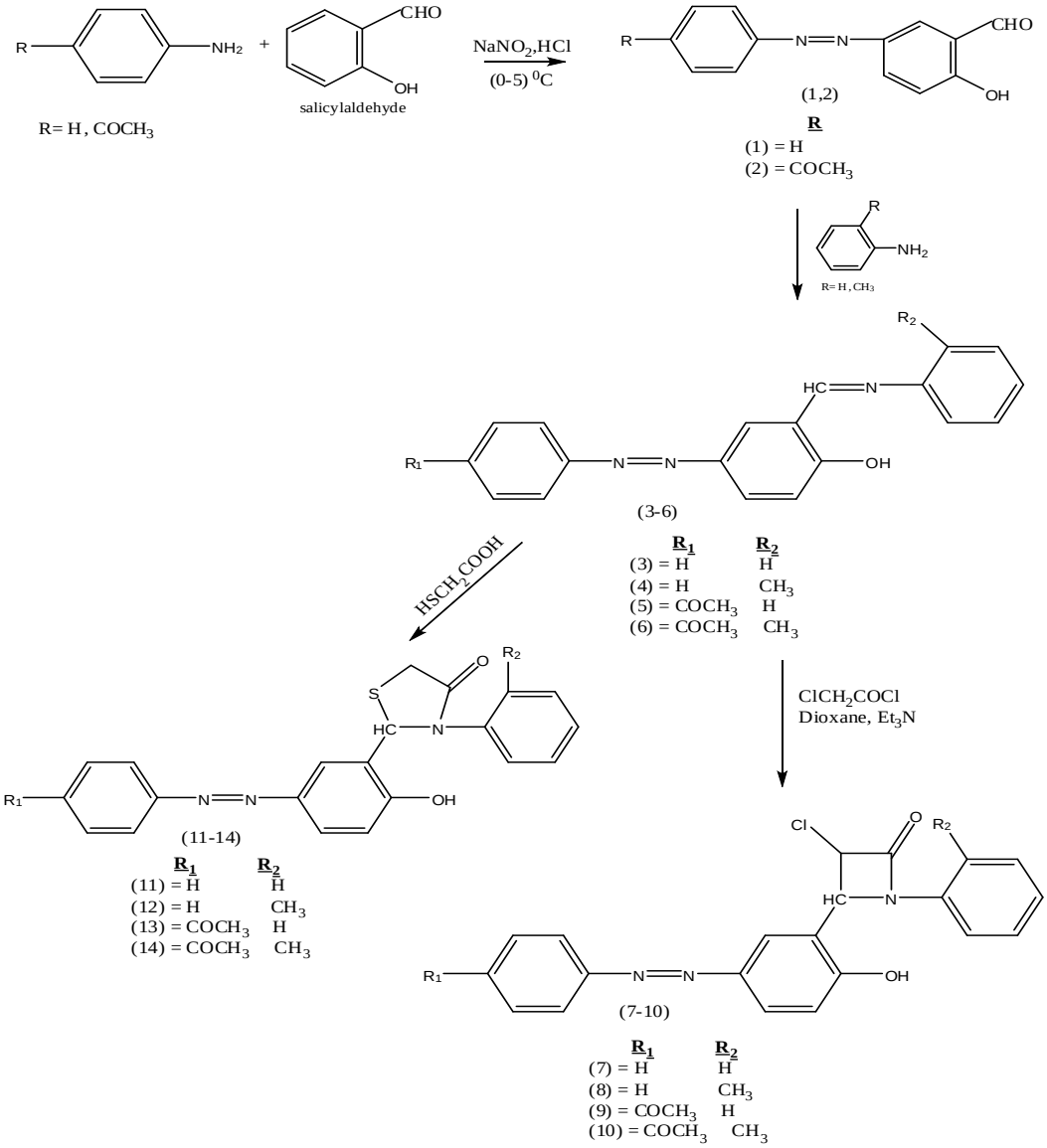
General procedure of preparation β –lactam[7-10]

To a stirred solution of compound (3) or (4) or (5) or (6) (0.01 mol)and triethylamin (0.02 mol) in DMF (15ml),chloracetyl chloride (0.02 mol) was added dropwise at (0-5)C°.The

reaction mixture was stirred for about 5-7 hours .The mixture was then poured into ice water, the product was recrystallized from ethanol.

General procedure of preparation thiazolidenones.[11-14]

A mixture of Schiff bases (3) or (4) or (5) or (6) (0.02 mol)and mercapto acetic acid (0.26ml,0.04 mol) in dry benzene (30 ml) was refluxed for 10 hrs., the mixture was concentred and recrystallized from methanol.



Scheme 1: Synthesis of new compounds.

RESULTS AND DISCUSSION

The new derivatives were prepared following the reaction sequences in scheme 1. Preparation diazonium salt from reaction the different primary aromatic amine (aniline and p-aminoacetophenone) with salicylaldehyde to gave new derivatives of salt (1,2). indicated by

disappearance of NH_2 stretching band at (3230)cm^{-1} and appearance (1566-1550) cm-1 due to N=N stretching vibration respectively (1,2),shown in table (1). Reaction compound (1,2) with primary amine to afforded Schiff base (3-6), the formation of these Schiff bases was indicated by the presence in their IR spectra of the azomethin CH=N stretching at (1620-1600) cm^{-1} while the ^{1}H-NMR (DMSO_d_6)δ ppm of compounds (3,5) show compound **3:** 11.2 (s,1H,OH),8.7(S,1H,C-H=N), 7.1- 8.0 m C-H proton of heterocyclic, and compound **5:** 11.2 (s,1H,OH),8.8 (S,1H,C-H=N), 7.1- 8.0 m C-H proton of heterocyclic ,2.5(s,3H ,CH_3CO) .Moreover ,treatment of Schiff bases with chloroacetic acid afforded β-lactam (7-10),the structures of compounds were confirmed by the presence of C=O stretching band β-lactam (1739-1730) cm^{-1}, and disappearance the azomethine bands (1620-1600) cm^{-1} . ^{1}H-NMR (DMSO_d_6)δ ppm of compounds (7,9) show compond **7:** 9.6(s,1H,OH), 5.4(d,1H,CHCHCl), 5.1 (s,1H, CHCHCl), 7.1-8 m C-H proton of heterocyclic. And compound **9:** 9.6(s,1H,OH), 5.3(d,1H, CHCHCl), 5.0(s,1H,CHCHCl),2.3 (s,3H,CH_3CO) 7.1-8 m C-H proton of heterocyclic. Condensation 2-mercaptoacetic acid with Schiff bases in dry benzene gave thiazolidenone derivatives (11-14). The mechanism of reaction is shown in Figure 1.

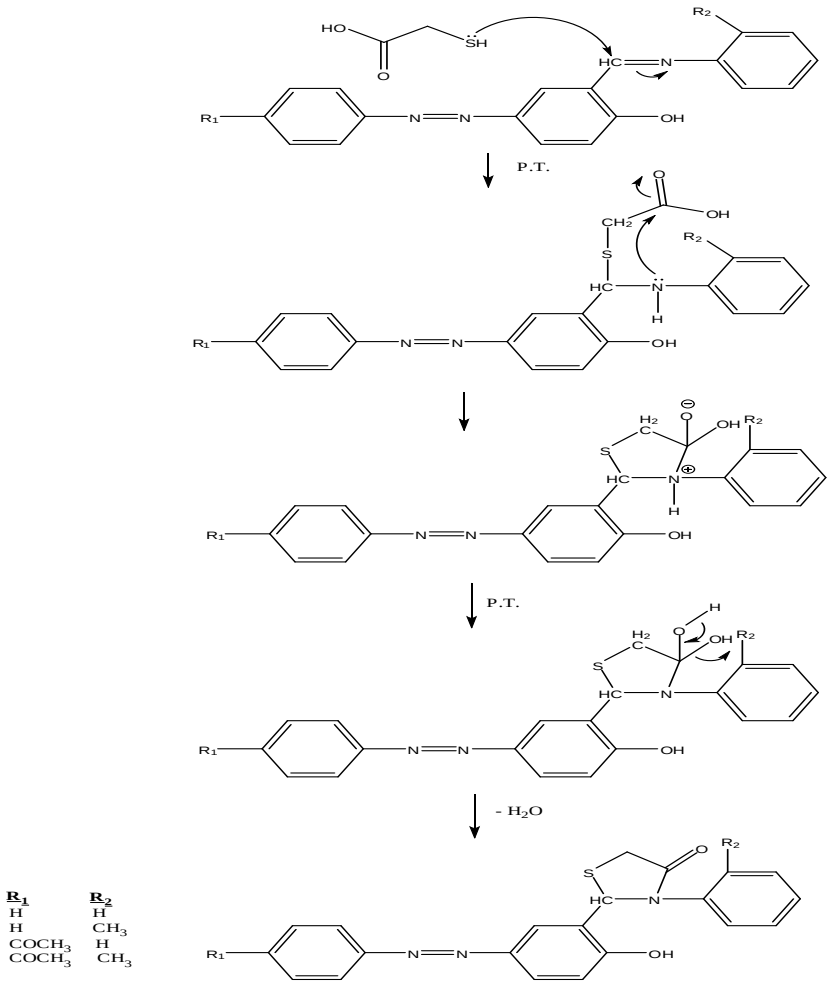


Figure 1: The mechanism of reaction.

These compounds was confirmed by the presence of C=O stretching bands (1740-1735) cm^{-1} due to thiaolidenone ring was the characteristic evidence for success of cyclazation step. ^{1}H-NMR (DMSO_d_6)δ ppm of compounds (11,13) show compound **11:** 9.6 (s,1H,OH), 6.4(s,1H,CH thiazoldenone), 4.0 (s,2H,C$\underline{H}_2$ tiazoldenone), 7.1- 8.0 m C-H proton of heterocyclic. and compound **13:** 9.5(s,1H,OH), 6.0(s,1H,CH thiazoldenone), 4.0 (s,2H,C$\underline{H}_2$ tiazoldenone), 7.1- 8.0 m C-H proton of heterocyclic,2.4(s,3H,C$\underline{H}_3$CO). All properties of synthesized compounds show in table **1** and **2**.

Table 1: Physical Properties and Spectral Data of Compounds.

No.	Formula M/Z	M.P °C	Yield %	Element analysis calculate / Found	FT-IR cm^{-1}
1	$C_{13}H_{10}N_2O_2$	195-197	80	**C**: 69.02/69.0, **H**: 4.46/4.40 **N:** 12.38/12.30	3450 OH,1698 C=O, 1566 N=N, 3098 C-H arom.1600 C=C.
2	$C_{15}H_{12}N_2O_3$	212-214	75	**C:** 67.16/67.13**,** **H:** 4.51/4.50 **N:** 10.44/10.40	3400 OH, 1700 C=O, 1550 N=N, 3080 C-H arom. C=O 1732, 1601 C=C.
3	$C_{19}H_{15}N_3O$	200-202	70	**C:** 75.73/75.70, **H**: 5.02/4.98 **N:** 13.94/13.90	1612 CH=N, 3095 C-H arom.,2890 C-H aliph., 3400 OH.
4	$C_{20}H_{17}N_3O$	219-221	70	**C:** 76.17/76.12, **H:** 5.43/5.40 **N**: 10.44/10.40	1616 CH=N, 3009 C-H arom.,2990 C-H aliph.,3440 OH.
5	$C_{21}H_{17}N_3O_2$	180-182	75	**C:** 73.45/73.40, **H:** 4.99/4.92 **N:** 12.24/12.20	1610 CH=N, 3085 C-H arom.,2880 C-H aliph.,3401 OH, 1725 C=O.
6	$C_{22}H_{19}N_3O_2$	198-200	70	**C:** 73.93/73.89, **H:** 5.36/5.30 **N:** 11.76/11.70	1620 CH=N, 3089 C-H arom.,2865 C-H aliph.,3430 OH, 1712 C=O.
7	$C_{21}H_{16}ClN_3O_2$	214-216	65	**C:** 66.76/66.70, **H:** 4.27/4.21 **N:** 11.12/11.10	1730 C=O β-lactam, 3080 C-H arom.,2810 C-H aliph.,1450 C-N,1049 C-Cl.
8	$C_{22}H_{18}ClN_3O_2$	224-226	65	**C:** 67.43/67.40**,** **H:** 4.63/4.60 **N:** 10.72/10.70	1739 C=O β-lactam, 3090 C-H arom.,2818 C-H aliph.,1444C-N,1011 C-Cl.
9	$C_{23}H_{18}ClN_3O_3$	188-190	75	**C:** 65.79/65.72, **H:** 4.32/4.30 **N:** 10.01/10.00	1736 C=O β-lactam, 1710 $COCH_3$, 3068 C-H arom.,2910 C-H aliph.,1434 C-N,1015 C-Cl.
10	$C_{24}H_{20}ClN_3O_3$	166-168	66	**C:** 66.44/66.40, **H:** 4.65/4.60 **N:** 9.68/9.61	1739 C=O β-lactam, 1718 $COCH_3$, 3011 C-H arom.,2812 C-H aliph.,1454 C-N,1047 C-Cl.
11	$C_{21}H_{17}N_3O_2S$	193-195	70	**C:** 67.18/67.12, **H:** 4.56/4.50 **N:** 11.19/11.12	1739 C=O thiazoledenone, 3010 C-H arom. ,2832 C-H aliph.,1444 C-N,675 C-S.

12	$C_{22}H_{19}N_3O_2S$	187-189	65	**C:** 67.84/67.80, **H:** 4.92/3.89 **N:** 10.79/10.72	1735 C=O thiazoledenone, 3090 C-H arom. ,2865 C-H aliph.,1424 C-N,670 C-S.
13	$C_{23}H_{19}N_3O_3S$	201-203	66	**C:** 66.17/66.12, **H:** 4.59/4.51 **N:** 10.07/10.00	1738 C=O thiazoledenone, 1710 C=O, 3088 C-H arom 2910 C-H aliph.,1450 C-N,675 C-S. 1542 C=C arom.,
14	$C_{24}H_{21}N_3O_3S$	210-212	65	**C:** 66.80/66.77**,** **H:** 4.91/4.86 **N:** 9.74/9.70	1740 C=O thiazoledenone, 1714 C=O, 3098 C-H arom 2810 C-H aliph.,1452 C-N,685 C-S. 1557 C=C arom

Table 2: Chemical Schiff's ^{1}H-NMR Spectra.

No.	^{1}H-NMR (DMSO_d_6)δ ppm
3	11.2 (s,1H,OH),8.7(S,1H,C-H=N), 7.1- 8.0 m C-H proton of heterocyclic.
5	11.2 (s,1H,OH),8.8 (S,1H,C-H=N), 7.1- 8.0 m C-H proton of heterocyclic,2.5(s,3H,CH_3CO)
7	9.6(s,1H,OH),5.4(d,1H,CHCHCl),5.1(s,1H,CHCHCl),7.1-8 m C-H proton of heterocyclic.
9	9.6(s,1H,OH),5.3(d,1H,CHCHCl),5.0(s,1H,CHCHCl),2.3 (s,3H,CH_3CO) 7.1-8 m C-H proton of heterocyclic.
11	9.6 (s,1H,OH), 6.4(s,1H,CH thiazoldenone), 4.0 (s,2H,CH_2 tiazoldenone), 7.1- 8.0 m C-H proton of heterocyclic.
13	9.5(s,1H,OH), 6.0(s,1H,CH thiazoldenone), 4.0 (s,2H,CH_2 tiazoldenone), 7.1- 8.0 m C-H proton of heterocyclic,2.4(s,3H,CH_3CO).

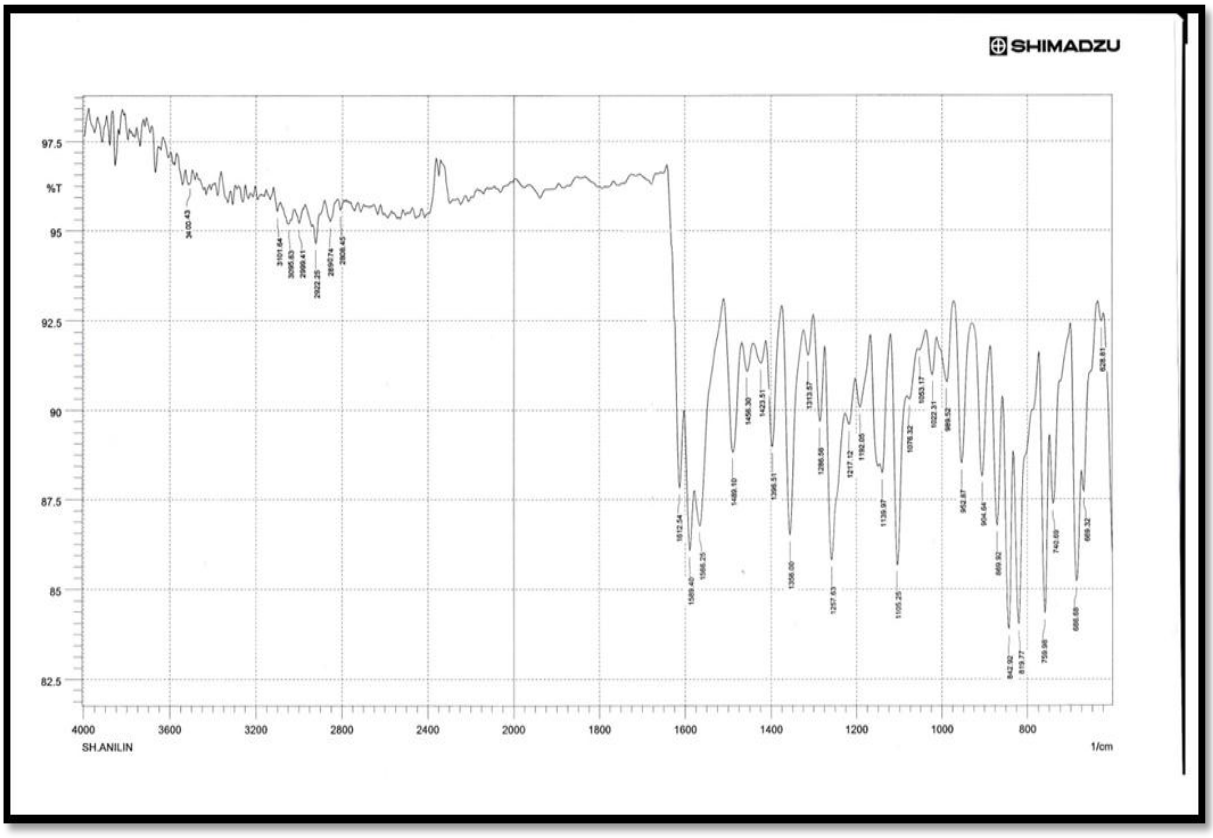


Figure 2: FT-IR Spectrum of compound (3)

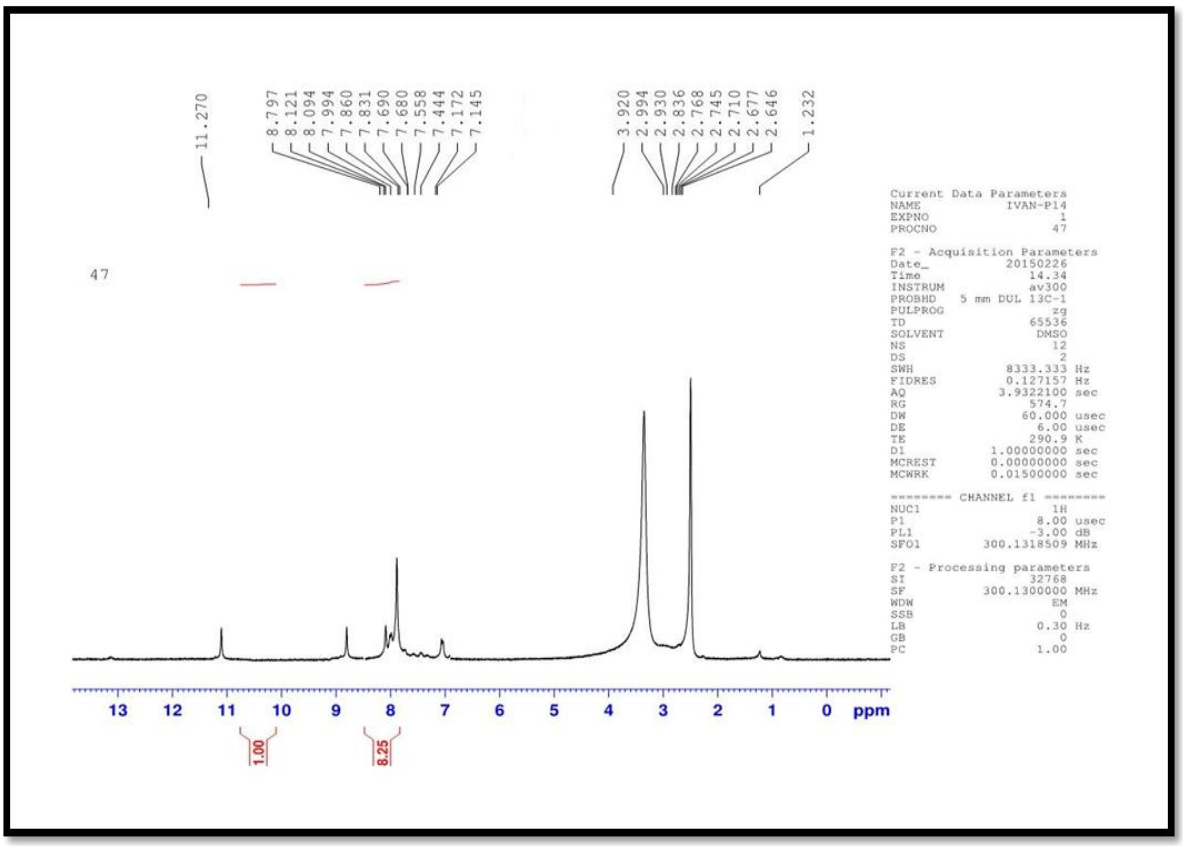


Figure 3: ^{1}H-NMR Spectrum of compound (3)

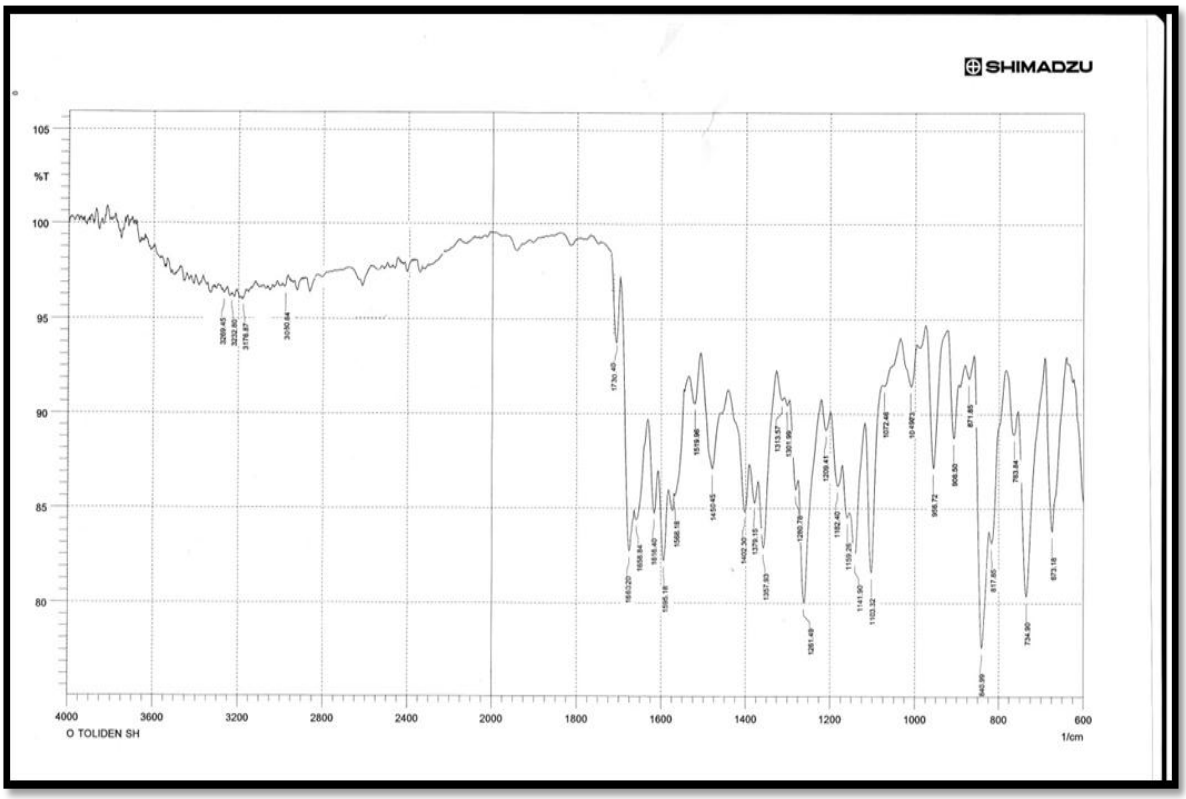


Figure 4: FT-IR Spectrum of compound (7).

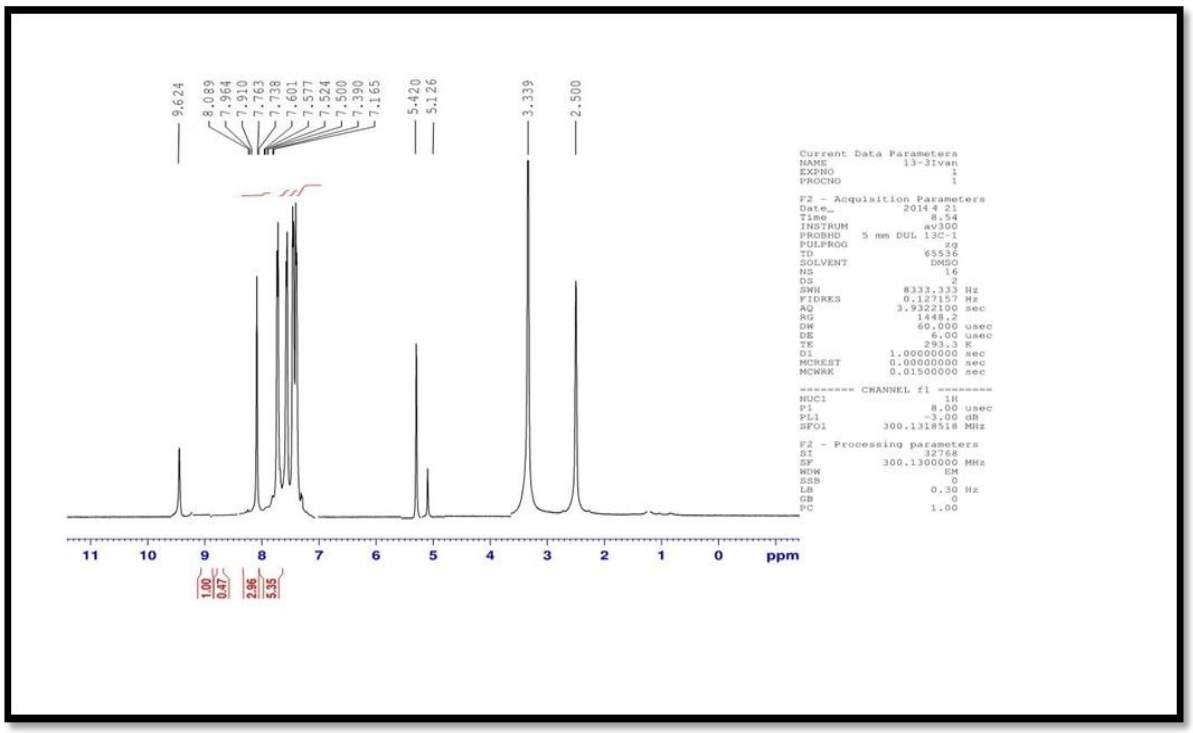


Figure 5: ^{1}H-NMR Spectrum of compound (7)

CONCLUSION

In the work described in this paper, the preparation of some Schiff bases compounds derived from azo compounds, the preparation of thiazolidenone derivatives, isolation, and characterization of a new compounds.

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