

Synthesis and Characterization of Some Hydra Zones

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Abstract: Hydrazones were synthesized from different triazole with schiff bases and various aldehyde under reflux in presence of alcohol and structure of synthesized compounds ascertained by spectroscopic techniques .H-NMR and C-NMR Spectral data and on the basis of melting point and TLC technique.

Keywords: Schiff base, Carbohydrazone Derivative, Triazole Derivative, Aldehyde.

1. Introduction

Hydrazone derivatives have attracted a great deal of interest in synthetic chemistry and considerable research on them in relation to their synthetic utility has been accomplished. Hydrazones are extensively studied as reactants or reaction intermediates since they can readily undergo various ring closure reactions. These compounds have interesting biological properties, such as anti-inflammatory, analgesic, anticonvulsant, antituberculous, antitumor anti-HIV and antimicrobial activity. Hydrazones are important compounds for drug design, as possible ligands for metal complexes organocatalysis and also for the syntheses of heterocyclic compounds the ease of preparation. Increased hydrolytic stability relative to imines, and tendency toward crystallinity are all desirable characteristics of hydrazones. Due to these positive traits hydrazones have been under study for a long time, but much of their basic chemistry remains unexplored. Hydrazones contain two connected nitrogen atoms of different nature and a C-N double bond that is conjugated with a lone electron pair of the terminal nitrogen atom. These structural fragments are mainly responsible for the physical and chemical properties of hydrazones (Figure 1). Both nitrogen atoms of the hydrazone group are nucleophilic, although the amino type nitrogen is more reactive. The carbon atom of hydrazone group has both electrophilic and nucleophilic character.

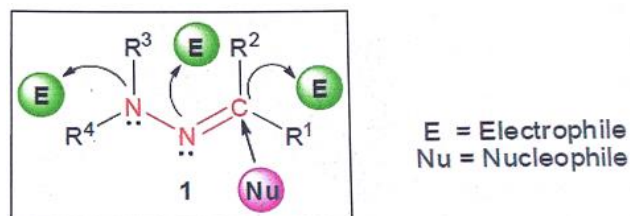


Fig. 1. Classification of active centers

Due to the capability to react with electrophilic and nucleophilic reagents, hydrazones are widely used in organic synthesis, especially for the preparation of heterocyclic compounds. Heterocyclic scaffold still attracts the attention of material chemists, because of its use as a chemically and thermally stable electron-withdrawing moiety in push-pull systems with potential application in nonlinear properties. synthesis of indoles according to the Fischer reaction, the synthesis of 4-thiazolidin-4-ones, the synthesis of azetidine by [2+2] cyclone addition and different synthesis of various five-membered heterocyclic compounds" by 1,3-dipolar cycloaddition of azomethine imines that are formed by a 1,2-H-shift as depicted as All these observations gave encouragement to commence a research program for the synthesis of new hydrazones containing a heterocyclic moiety.

A. Schiff base

A Schiff base, named after Hugo Schiff, is a compound with a functional group that contains a carbon-nitrogen double bond with the nitrogen atom connected to an aryl or alkyl group, not hydrogen. Schiff bases in a broad sense have the general formula $R_1R_2C=NR_3$, where R is an organic side chain. In this definition, Schiff base is synonymous with azomethine. Some restrict the term to the secondary aldimines (azomethines where the carbon is connected to a hydrogen atom), thus with the general formula $R_1R_2C=NR_3$. Schiff bases can be synthesized from an aliphatic or aromatic amine and a carbonyl compound by nucleophilic addition forming a hemiaminal, followed by a dehydration to generate an imine Schiff bases are common enzymatic intermediates where an amine such as the terminal group of a lysine residue reversibly reacts with an aldehyde or ketone of a cofactor or substrate. The common enzyme cofactor PLP forms a Schiff base with a lysine residue and is transaldiminated to the substrate(s). Similarly, the cofactor retinal forms a Schiff base in rhodopsins, including humans rhodopsin (via Lysine) which is key in the photoreception mechanism .An example where the substrate a Schiff base to the enzyme is in the fructose 1,6- biphosphate aldolase catalyzed reaction during glycolysis and in the metabolism amino acids. Schiff bases derived from aromatic amines and aromatic aldehydes have a wide variety of applications in many fields, e.g., biological, inorganic and analytical chemistry. Application of many new analytical devices requires the

presence of organic reagents as essential compounds of the measuring system. They are used in optical and electrochemical sensors, as well as in various chromatographic methods, to enhance detection of selectivity and sensitivity. Among the organic reagents actually used, Schiff bases possess excellent characteristics structural similarities with natural biological substances. Relatively simple preparation procedures and the synthetic flexibility that enables design of suitable structural properties. Schiff bases are widely applicable in analytical determination, using reactions of condensation of primary amines and carbonyl compounds in which the azomethine bond is formed (determination of compounds with an amino or carbonyl group); using complex formation reactions (determination of amines, carbonyl compounds and metal ions): Unfortunately. Most Schiff bases are chemically unstable and show a tendency to be involved in various equilibria, like tautomeric interconversions, hydrolysis, or formation of ionized species. Therefore, successful application of Schiff bases requires a careful study of their characteristics. Schiff bases of *o*-phenylenediamine derivatives have a variety of applications including biological, clinical and analytical. Schiff bases are used as substrates in the preparation of a number of industrial and biologically active compounds via ring closure, cycloaddition and replacement reactions for many years particular attention has been paid to the synthesis and study of diimino Schiff bases.

B. Carbohydrazide derivative

In the literature it is reported that some benzohydrazide are used to inhibit fibrosis and to treat fibrosing disorder. Several aryl- and heteroaryl hydrazides produce inhibitory effects on glutamic acid decarboxylase (GAD), GABA-a-oxoglutarate amino transferase (GABA-T) and monoamine oxidase. Moreover, Isoniazid, namely pyridine-carbohydrazide, is the drug of choice in the treatment of tuberculosis, in carbohydrazide reduction, gas chromatography, a highly concentrated reducing agent which is solvent-free is employed. This reduces the time of reaction and drives the reaction to completion as well. Carbohydrazide reduction gas chromatography for azo and nitro compounds has advantages in addition to rapid analysis. It enables mixtures of azo compounds and nitro compounds to be resolved. No interference due to rearrangement to benzidine or biphenyl is encountered upon reducing the azo compounds, nor is there any interference due to the saturation of the aromatic rings. Also, the use of hydrogen as a gas chromatography carrier gas is avoided and the sample does not have to be volatilized into the reactor. In the method described below. The sample is fused with the reductant and the volatile primary amines liberated are monitored gas chromatographically. The resulting primary amines help define the nature of the azo compound. Another advantage of the carbohydrazide reduction method is the use of micro samples; 0.1-0.2 milligrams usually suffice. The quantitation is achieved by measurement of the primary amine the chemistry of carbohydrazide and thiocarbohydrazide,

though first sporadic, has steadily increased; earlier major studies were undertaken by Wilson and his coworkers at Glasgow, and by Guha and his School at Dacca University, India. More recently, advances have been reported from numerous laboratories: they include the more notable contributions of Audrieth. Who carefully reinvestigated and improved thiocarbohydrazide syntheses, of Sandstrom at Lund, and of Beyer and his coworkers at Rostock, whose main interests were the use of these nitrogenous compounds in heterocyclic synthesis. Carbohydrazides and their hydrazones are widely applied in the synthesis of diverse heterocycles. To the best of our knowledge, there are only a few publications dealing with preparations of carbohydrazide hydrazones, particularly the bishydrazones.

C. Triazole derivatives

The synthesis of high nitrogen containing heterocyclic systems has been attracting increasing interest over the past decade because of their utility in various applications. In recent years, the chemistry of triazoles and their fused heterocyclic derivatives has received considerable attention owing to their synthetic and effective biological importance. The presence of three nitrogen hetero-atoms in five membered ring system defines an interesting class of compounds, the triazole. It exists in two tautomeric forms. The 1,2,3-triazole (1) and the 1,2,4-triazole (2). 1H and 4H-1,2,4-triazole is considered to be pharmacologically important nucleus. As Antibacterial and Antifungal Activity Sahar M. I. Badr et al, synthesized new series of fused 1,2,4-triazoles such as, 6-lary (5-nitrofuranyl)-5,6-dihydro-1,2,4-triazolo [3,4-b]thiadiazoles, 6-alkylamino-3-(5-nitrofuranyl)-[1,2,4]triazolo[3,4-b]thiadiazoles substituted phenyl-3-(5-nitrofuranyl)-7H-1,2,4-triazolo[3,4-b][1,3,4]thiadiazines and evaluated for their antibacterial activity.

2. Origin of work

Hydrazones and their derivatives constitute a versatile class of compounds in organic chemistry. These compounds have interesting biological properties, such as anti-inflammatory, analgesic, anticonvulsant, antituberculous. Antitumor, anti-HIV and antimicrobial activity. Hydrazones are important compounds for drug design, as possible ligands for metal complexes, organocatalysis and also for the syntheses of heterocyclic compounds the ease of preparation, increased hydrolytic stability relative to imines, and tendency toward crystallinity are all desirable characteristics of hydrazones. There has been considerable interest in the development of novel compounds with anticonvulsant, antidepressant, analgesic, antiinflammatory, antiplatelet, antimalarial, antimicrobial, antimycobacterial, antitumoral, vasodilator, antiviral and antischistosomiasis activities. Hydrazones possessing an azametine -NHN=CH- proton constitute an important class of compounds for new drug development. Therefore, many researchers have synthesized these

compounds as target structures and evaluated their biological activities. These observations have been guiding for the development of new hydrazones that possess varied biological activities. Schiff base have assume importance fill such as follows catalyst:-schiff bases shows catalytic activity in oxygenation of alkene Antimicrobial activities: some heterocyclic schiff bases can antibacterial agent ISTAIN derived Schiff bases poses anti-HIV activity and antibacterial activity Anti-viral activity: Schiff bases of gossypol shows high anti-viral activity glycine salicylaldehyde as Schiff base of Ag gave effective result towards C.mosaic virus. In addition of above, Schiff bases have assumed lot of importance in various other field like coordination chemistry, analytical, pigments dyes and polymer industries.in biochemical research especially model compounds of several vitamins and enzyme and agriculture fields.

3. Experimental study

Presentent study is sub-divided as, Part I: It comprises introduction of

- Hydrazone
- Carbohydrazone derivatives
- Schiff bases
- Triazole derivatives

Part II: Experimental work, it involves Synthesis of Benzaldehyde (BALLS)

- Synthesis of Bis-triazole.
- Synthesis of thiocarbohydrazone
- Synthesis of Compound I
- Synthesis of compound II

Part III: It comprises of result

A. Synthesis of bis aldehyde Schiff Base (BAL)

Salicylaldehyde (0.15moles dissolved in hot ethanol KOH(prepared by dissolving ROH(0.15mole) in a 20 ml of absolute Ethanol) stirs for 10min. and the solvent was then removed under Vacuum. The residue was dissolved in DMF (7ml) and the appropriate dibromopentane (0.075 mole) was added. The mixture was refluxed for 15 min during which KBr separated out. The KBr was removed by filtration and the resulting solution was poured into water and ppt is formed. The ppt was filtered and recrystallize with water/DMF (1; 2) to give pure bisaldehyde Dry it and weight it. Colour of product: Brown. Melting point of product: - 213°C

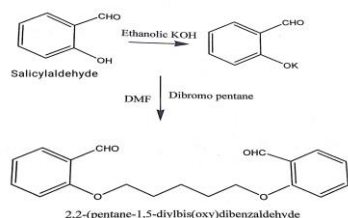


Fig. 3. DMF

B. Synthesis of thiocarbohydrazone

Take 50ml of hydrazine hydrate, 50 ml water in round bottom flask Then take carbon disulphide 15ml.then keep that round bottom flask on magnetic stirrer and then add dropwise carbon disulfide to it with constant stirring maintaining temperature below 20°C after that keep that reaction mixture for 2hour on magnetic stirrer. Reflux this for 2-3hour then on cooling yellow needles are obtained that yellow needle was filtered out and recrystallization of that product was done with the water. After recrystallization white coloured product is obtained which is thiocarbohydrazone dry this compound and weight it. Colour of product: White, Nature:-Crystalline Yield of product: 75 % , Melting point: - 170 °C

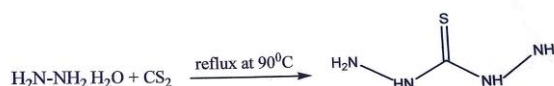


Fig. 2. Thiocarbohydrazone

C. Synthesis of bis- triazole compound

Malonic acid (1.04 gm) and thicarbohydrazone (2.12gm) added to the round bottom flask after that round bottom flask was placed on sand bath at 170°C for one an half hour .then progress of the reaction was checked with the help of lead acetate paper it turns black when it hold at the mouth of the test tube due to the evolved hydrogen disulphide .At the completion of the reaction lead acetate paper remain as it is the above mixture was poured into ice cold water and after few minute. Sodium carbonate was added to it removes the unreacted malonic acid and then filtered product was purified by hot water. Melting point: 250°C. Yield of product: 69%.

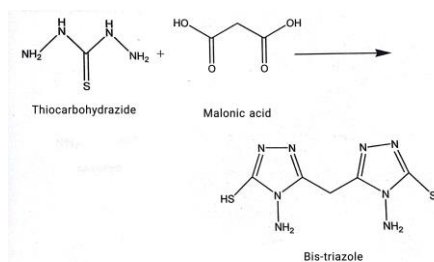


Fig. 4. Synthesis of bis- triazole compound

D. Synthesis of compound I (CHNES)

Sr.No.	Chemical shift (δ) in ppm	Multiplicity	No. of Carbon	Nature of Protons
1	20.5	triplet	1C	-CH ₂ -
2	28.8	triplet	2C	-CH ₂ -CH ₂ - C
3	72.3	triplet	2C	CH ₂ -O
4	114-131	mutiplate	8C	Ar-C
5	155	doublet	2C	CH=N
6	17.0	quintet	2C	CH ₃ -CH
7	161	singlet	1C	C=O

To the mixture of carbohydrazone (0.45gm and bis ketone

(1.7m) in aqueous ethanol was added 1 ml acetic acid and reflux it for 3 hours. After which time the product is precipitated. The reaction mixture was allowed to cool and the product was collected by filtration. Wash with hot water and with ethanol. Melting point: 115°C

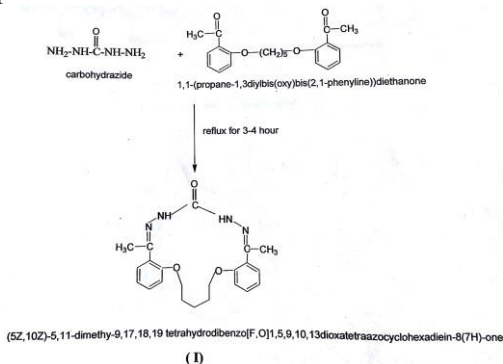


Fig. 5. Synthesis of compound I (CHNES)

E. Synthesis of compound II (BTAL5)

The mixture of bis-triazole (0.61gm) and bis aldehyde (0.8gm) in DMF was added I ml Acetic acid and then reflux it for 3hours after which time the product is the reaction mixture was allowed to cool and the product was collected by the filtration wash with hot water. Melting point: 140°C.

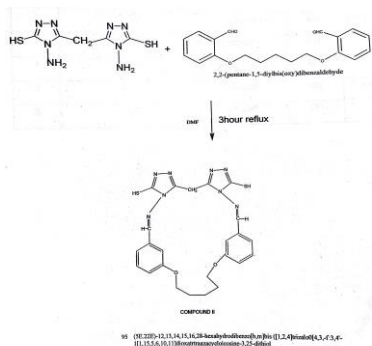


Fig. 6. Synthesis of compound II (BTAL5)

4. Results and discussion

All chemicals used as starting material in the synthesis are chemically pure. The H-NMR. C-NMR spectral data. synthesized compounds were characterized on the basis of melting point, TLC, The H-NMR spectrum analysis of CHNES showed the presence of following peaks the chemical shift can be correlated as below as per the literature.

Sr.No.	Chemical shift (δ) in ppm	Multiplicity	Protons	Nature of Protons
1	1.29	quintet	2-H	-CH ₂ -CH ₂ -CH ₂ -
2	1.71	quintet	4H	-CH ₂ -CH ₂ -CH ₂ -
3	4.12	triplet	4H	CH ₂ -O
4	7.14	mutiplate	8H	Ar-H
5	2.13	Singlet	6H	CH ₃ -C=N
6	7.0	singlet	2H	N-H

¹³C spectrum analysis CHINES showed the presence of peaks the chemical shift can be correlated as below as per the literature

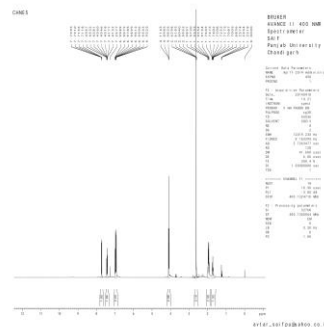


Fig. 7. NMR

NMR spectrum analysis of BTAL5 showed the presence of peaks the chemical shift can be correlated as below as per the literature.

Sr.No.	Chemical shift (δ) in ppm	Multiplicity	Protons	Nature of Protons
1	1.9	quintet	2H	-CH ₂ -CH ₂ -
2	2.3	quintet	4H	-CH ₂ -CH ₂ -CH ₂ -
3	4.1	triplet	4H	CH ₂ -O
4	7.7	mutiplate	8H	Ar-H
5	10.5	singlet	2H	CH=N
6	13.5	singlet	2H	SH

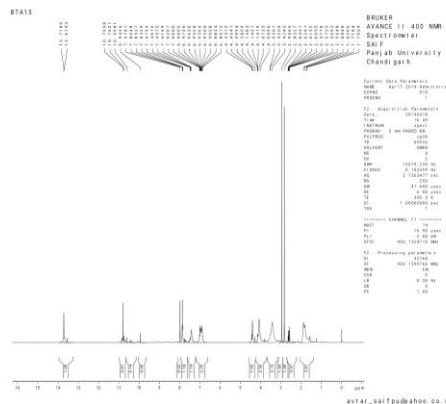


Fig. 8. NMR

5. Conclusion

Importance of hydrazones in academics commercial and pharmacological fields interest in the hydrazones compound synthesis which led to the synthetic study of hydrazones compound derived from carbonylhydrazide in order to obtain complete understanding of the compound, attention has been paid towards the synthesis, structural. spectral properties of hydrazones compound remarks obtained. The present work is oriented towards synthesis of Schiff bases of bis-hydrazone by

condensing of salicylaldehyde with different benzohydrazide in presence of ethanol all the synthesis compound have been characterize on the basis of their melting point, TLC and ¹H-NMR Spectral data. The main aim of the present work is to find new molecules such as their by synthesis several of hydrazones from bis-aldehyde and bis-triazole.

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