

# Synthesis and Spectroscopic Characterization of Modified Schiff Bases Derived from 2,4-Dinitro Phenyl Hydrazine

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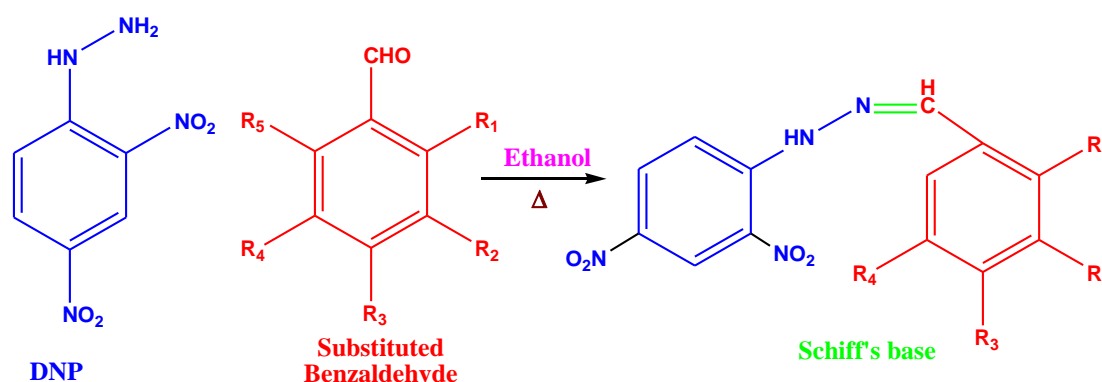
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## ABSTRACT

Ambient synthesis of modified Schiff bases derived by condensation of 2,4-dinitro phenyl hydrazine has refluxing with aryl aldehydes such as veratraldehyde (3,4-dimethoxybenzaldehyde), 3-nitrobenzaldehyde, Anisaldehyde (4-Methoxy Benzaldehyde) and Furfuraldehyde (Furan-2-carbaldehyde) followed by magnetic stirring gives derivatives of Schiff bases. All the modified Schiff bases has analysing by Spectroscopic technique including FTIR, H<sup>1</sup>NMR and LCMS were used to identify the desired products.

**Keywords :** Schiff base, 2,4-dinitrophenylhydrazine, FTIR, H<sup>1</sup>NMR, Schiff bases and LCMS.



**Scheme :** Ambient Synthesis of Modified Schiff Bases

## I. INTRODUCTION

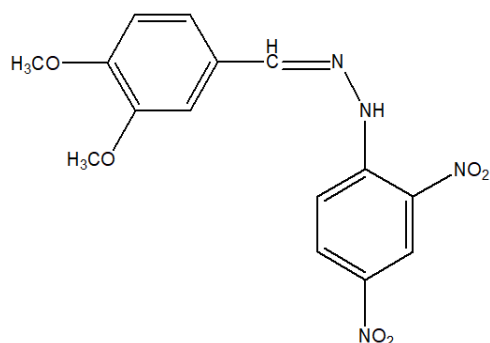
The condensation of primary amines with aldehydes and ketones has a numerous applications<sup>1</sup> for preparative, detection, determination, purification and biological uses. These applications<sup>2-3</sup> encourage the workers to prepare these imines for the last 10 decades.

The classical method<sup>1</sup> for synthesis of imines is by mixing equimolar quantities of aldehyde or ketone with the primary amines. Schiff bases or imines have the general formula  $RN=CR'$  where there the R and R' are alkyle, aryl ,cyclo alkyl or hetro cyclic groups. Imines play an important role in many biochemical reactions because some of the enzymes use an amine group of an amino acid to react with an aldehyde or

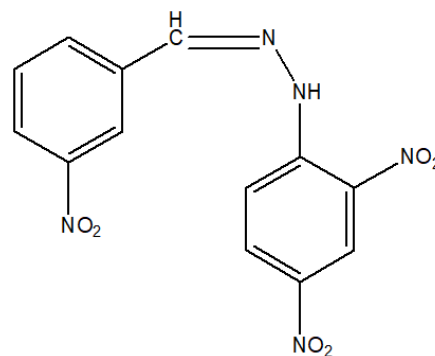
ketone to form an imine linkage. In the present work nitro Schiff bases<sup>7</sup> are synthesized from reactions of veratraldehyde, 3-nitrobenzaldehyde, anisaldehyde and furfuraldehyde with 2,4-dinitro phenyl hydrazine. In this study we report the synthesis and characterization of four potential Schiff base ligands. Structural formulas for the following ligands, depicted in their Schiff base forms, are given in Fig. 1.

- 1-(3,4-dimethoxybenzylidene)-2-(2,4-dinitrophenyl)hydrazine,
- (Z)-1-(3-nitrobenzylidene)-2-(2,4-dinitrophenyl)hydrazine,
- 1-(4-methoxy phenyl amino)-2-(2,4-dinitrophenyl)hydrazine,
- (E)-1-((furan-2-yl)methylene)-2-(2,4-dinitrophenyl)hydrazine,

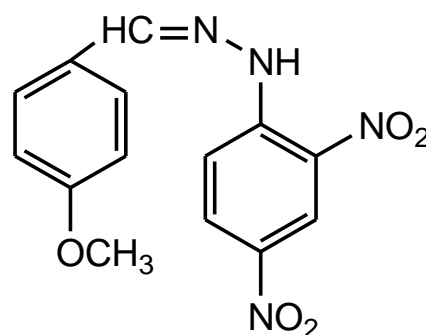
A special care is given to the structural elucidation of these new Schiff's base or imines by using analytical techniques namely, UV, FT-IR, <sup>1</sup>H-NMR and Mass spectra.



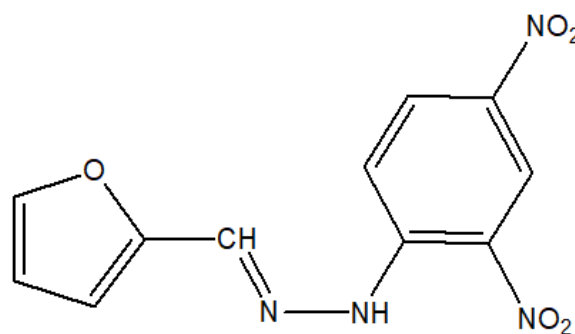
1-(3,4-dimethoxybenzylidene)-  
2-(2,4-dinitrophenyl)hydrazine  
(a)



(Z)-1-(3-nitrobenzylidene)-  
2-(2,4-dinitrophenyl)hydrazine  
(b)



1-(phenoxy methane amino)-  
2-(2,4-dinitrophenyl)hydrazine  
(c)



(E)-1-((furan-2-yl)methylene)-  
2-(2,4-dinitrophenyl)hydrazine  
(d)

**Figure 1** : Structure of Synthesized Schiff's Bases

## II. MATERIALS AND METHODS

### Materials and Physical Measurements

All the chemicals which has been used during the synthesis of schiff's base were supplied by Sigma

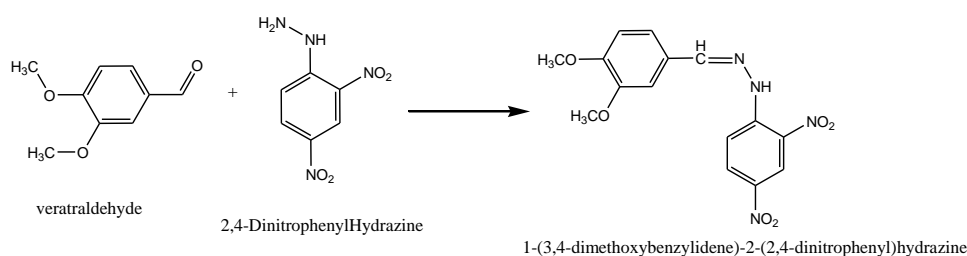
Aldrich, Loba used as received. FTIR spectra were recorded using Bruckner spectrometer, H1NMR characterization were carried by using Bruker Avance Neo 500 MHz NMR spectrometer and LCMS were carried out using Tetra methyl Silane (TMS) as standard.

## III. EXPERIMENTAL

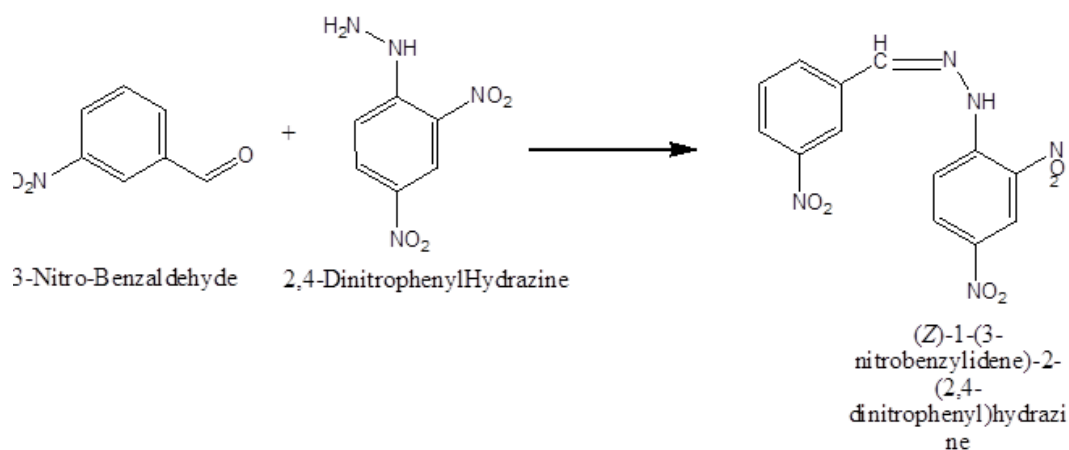
### Synthesis of Schiff's base (S-1, S-2, S-3 & S-4)

Schiff's bases were synthesized by addition of 2,4-dinitrobenzaldehyde (mmole) and ethanol (ml) in 100 ml beaker equipped with stirrer bar placed on magnetic stirrer and stirred the solution at room temperature about 10min or until all the solid has dissolved. Add a solution of aldehyde (mmole) in ethanol (ml) and continuous stirred the solution and transferred into 100 ml round bottom flask equipped with water condenser placed on heating mental the solution turns semisolid mass before the product precipitate over 30 min as remarkable colour ppt. the product recovered quantitatively yield by filtration and washed with small quantities of ethanol to remove any unreacted starting materials. The product was recrystallized from a minimum volume of ethanol. The preparation scheme of Schiff's bases are given in figure 2.

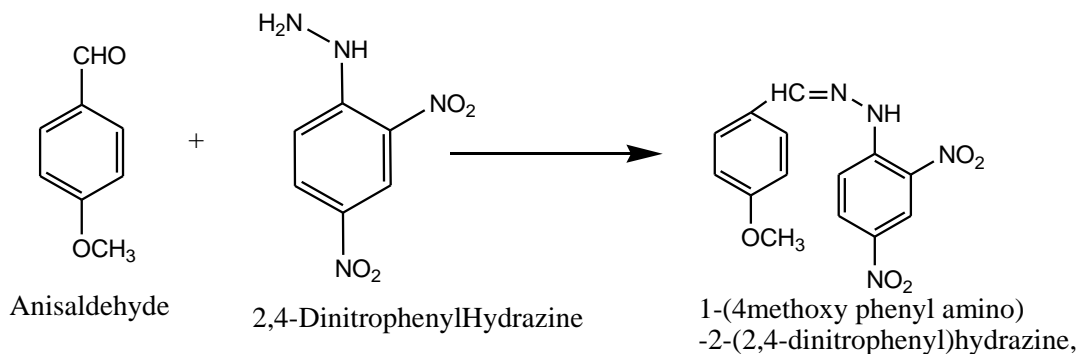
S-1



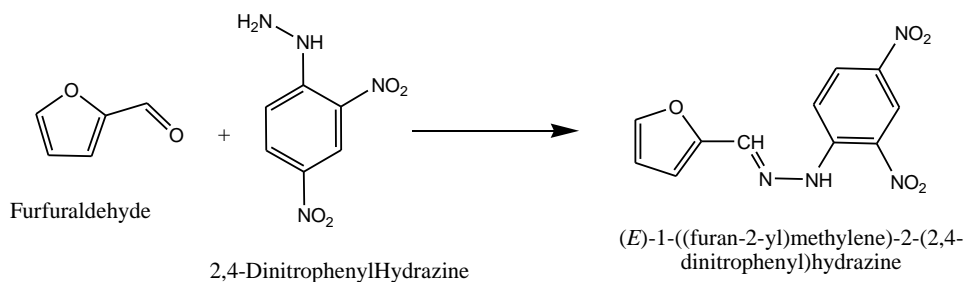
S-2



S-3



S-4



#### IV. RESULTS AND DISCUSSIONS

##### <sup>1</sup>H NMR Spectra:

<sup>1</sup>H NMR spectra of the investigated compounds which were dissolved in denatured di methyl sulphoxide (DMSO) are shown in table 1. The <sup>1</sup>H NMR spectra of Schiff's base ligand shows the multiple signals in the region of  $\delta$  7.12-7.95 ppm which can be attributed to the aromatic proton. The singlet band at  $\delta$  8.14-8.80 ppm due to the single proton of HC=N moiety and singlet band at  $\delta$  7.05-7.17 ppm for the proton -NH.

**Table 1 :** <sup>1</sup>H NMR spectral data's of synthesized compounds

Scheme	Aldehyde	Compound	Remarkable Colour Property	HC=N	-NH	Aromatic Proton
S-1/DNP-1	Vanillin	1-(3,4-dimethoxybenzylidene)-2-(2,4-dinitrophenyl)hydrazine	Tomato Red	8.602 (s)	7.07 (s)	7.12-7.95 (m)
S-1/DNP-2	3-Nitro Benzaldehyde	( <i>Z</i> )-1-(3-nitrobenzylidene)-2-(2,4-dinitrophenyl)hydrazine	Dark Yellow	8.807 (s)	7.17 (s)	7.39-7.95 (m)
S-1/DNP-3	Anisaldehyde	1-(4-methoxy phenyl amino)-2-(2,4-dinitrophenyl)hydrazine,	Faint Orange	8.64 (s)	7.06 (s)	7.75-7.77 (m)

S-1/DNP-4	Furfuraldehyd e	(E)-1-((furan-2-yl)methylene)- 2-(2,4-dinitrophenyl)hydrazine	Blackish Gray	8.14 (s)	7.05 (s)	7.12-7.88 (m)
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### IR Spectra

The FTIR spectra indicated the  $\nu(\text{C}=\text{N})$  bands appear as a strong bands at  $1608.6 - 1647.7 \text{ cm}^{-1}$ . The appearance of bands in the region  $2846.0 - 2946.0 \text{ cm}^{-1}$  which could be attributed to asymmetric and symmetric stretching vibration of  $\nu(-\text{CH})$ . The peaks appeared at  $1506.4 - 1525.7 \text{ cm}^{-1}$  due to  $\nu(\text{C}=\text{C})$  stretching vibrations.

### Mass Spectra

Mass spectra provide a vital clue for elucidating the structure of compounds<sup>18</sup>. The observed molecular ion peak(s) at  $m/e$  349.12, 327.15, 327.17 and 252.96 for Schiff's base S-1, S-2, S-3 and S-4 respectively. The results were complement with the proposed molecular formulae of the Schiff's base.

**Table 2** : Mass and IR spectral data's of synthesized compounds

Scheme	Aldehyde	Compound	IR Spectra $\text{cm}^{-1}$	Mass Spectra
S-1/DNP-1	Varatraldehyde	1-(3,4-dimethoxybenzylidene)-2-(2,4-dinitrophenyl)hydrazine	1608.5, 1647.7, 2876.0, 1500.9	349.12
S-1/DNP-2	3-Nitro Benzaldehyde	(Z)-1-(3-nitrobenzylidene)-2-(2,4-dinitrophenyl)hydrazine	1677.9, 1671.8, 2851.6 1512.3	327.15
S-1/DNP-3	Anisaldehyde	1-(4methoxy phenyl amino)-2-(2,4-dinitrophenyl)hydrazine,	1554.6 1671.2, 1643.5, 1531.2	327.17
S-1/DNP-4	Furfuraldehyde	(E)-1-((furan-2-yl)methylene)-2-(2,4-dinitrophenyl)hydrazine	1528.1, 1639.8, 1525.7, 1238.6	252.96

### V. CONCLUSION

Schiff bases are imine derivative prepared by the condensation of primary amines with carbonyl compounds such as aldehyde or ketone. Schiff bases gaining importance day by day in present scenario due to pharmacological activities as anticancer, AIDS diseases. In this research work 2,4dinitrophenyl hydrazine is used as a source of primary amine to prepare modifies Schiff's bases with product yield more

than 90%. Schiff bases are the compounds carrying imine or azomethine ( $-\text{C}=\text{N}-$ ) functional group and are found to be a versatile pharmacophore in antigenotoxicity.

### VI. ACKNOWLEDGMENT

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thankful to SAIF Chandigarh for Spectrometric characterization of all synthesized Schiff bases compounds.

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