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Synthesis and Characterization of Schiff Base from Aromatic Amine and Aromatic P-Nitro Benzaldehyde

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ABSTRACT

The synthesis of Schiff base From Aromatic Amine And Aromatic P-Nitro benzaldehyde was performed by a novel method of stirring followed by the addition of p-nitro benzaldehyde&m-nitro aniline (0.02M). Characterization of the synthesized compounds, determination of purity and identity of the compounds using following spectroscopic and chromatographic techniques-Solubility, Thin Layer Chromatographic studies, Ultra-Violet studied rotational and vibrational studies (FT-IR) studies. The compounds were investigated for their Antimicrobial activity by cup plate method. Compound1- nitro - 4(1-imino,4-nitrophenyl) benzene was found to be the most active according to pharmacological evaluation exhibited antimicrobial.

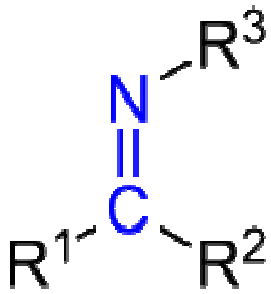
KEYWORDS: *Schiff base, p-nitrobenzaldehyde, antimicrobial activity*

INTRODUCTION

Schiff bases are potentially biologically active compounds and have been reported to possess antifungal, anticancer, anticonvulsant and diuretic activities. Schiff bases derived from various heterocycles were reported to possess cytotoxic activity. It is believed that the presence of a nitro group in the *p*-position appears to be an important condition for the development of the bacteriostatic activity. Nitroaromatic compounds are widely used in medicine, industry and agriculture. The anti-malarial activity of nitroaromatic compounds was attributed to the formation of reactive oxygen species during flavoenzyme catalyzed redox cycling reactions and/or oxyhemoglobin oxidation.[1,8]

With this envision in mind, we synthesized several new Schiff bases derived from *p*-nitrobenzaldehyde by condensation with the appropriate amines. The structures of the compounds were identified using spectroscopic techniques.

Fig. 1:-Chemical structure of the Schiff base



MATERIAL AND METHODS:-

Chemicals: -

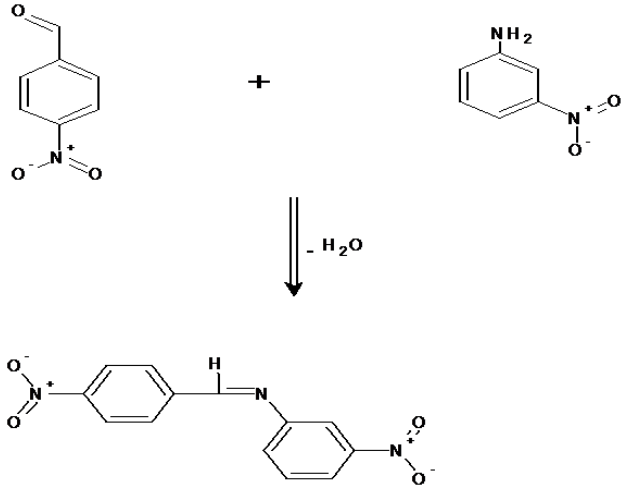
p-nitrobenzaldehyde, m-nitro aniline, ethanol, sodium hydroxide. All other chemicals used were laboratory grade.

EXPERIMENTAL:- The melting points were determined in open capillary tube and are uncorrected; purity of compounds was checked by TLC silica gel-G plates.IR spectra were recorded in KBr pellets. UV studies were carried out on a UV Visible spectrophotometer (Shimadzu 1700) and the λmax of the respective synthesized compounds was determined using ethanol as the solvent. Antimicrobial activity of the compounds was tested by cup plate method.

Synthesis

General procedure for the synthesis of 1- nitro - 4(1-imino,4-nitrophenyl) benzene
(Schiff's base):-

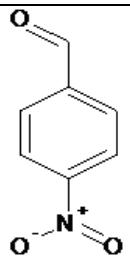
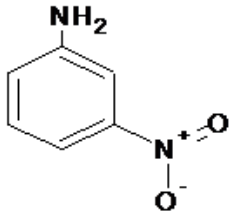
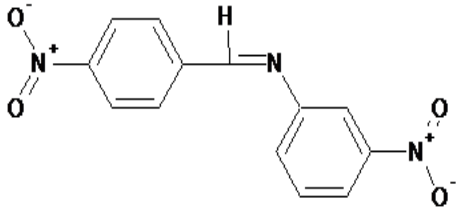
Scheme



General procedure for the synthesis of 1- nitro – 4 (1-imino, 4-nitrophenyl) benzene (Schiff's base):-

The synthesis was started with 11.15 mlbenzaldehyde, which was mixed with 7.2 ml ethanol. After this 11.35 gm of m-nitro aniline(0.02M) was added to this alcoholic solution. The whole mixture was stirred with the addition of 2 to 3 drops NaOH solution. The mixture was allowed to reflux for 4 hours. After reflux cold water was added and the solid yellow product was obtained. The reaction was monitored by TLC (Toulene: methanol: glacial acetic acid =8:2:0.3). Product was filtered and dried for further use. The crude product upon recrystallization from alcohol gave pure Imines. The synthesized compounds were characterized on the basis of their spectral and analytical data. (UV, IR).

Table.No.1:- Aldehyde, amine and there Schiff base analogs

Sr. No.	Aldehyde (P-nitro-benzaldehyde)	Amine (m-nitro aniline)	Schiff base : (1- nitro – 4 (1-imino,4-nitrophenyl) benzene)
1			

MATERIALS AND METHODS for Antimicrobial activity:-

Chemicals-:

Standard drugs ciprofloxacin, Nutrient agar medium [NO11], and normal saline, barium chloride, 0.36N H2SO4.

METHOD FOR ANTIMICROBIAL ACTIVITY DETERMINATION:-

Antimicrobial disc –diffusion method [6]

A. Preparation of culture media for antibacterial sensitivity test nutrient medium (100ml) was prepared as per the procedure is given for the preparation of slants respectively.
Then it was sterilized in an autoclave at 15lbs pressure (121°C) for 15 min.
After sterilization, the media was cooled up to 45°c, poured 20-25ml in sterile Petri plates in aseptic condition and allowed to solidify.

B. Inoculation of suspension of bacteria on culture media sterile nontoxic swab was dipped into the standardized inoculums and than the entire ajar surface of the plate was streaked with the swab three times, turning the plate at 60 angles between striking. then the streaked inoculum was allowed to dry for 5-15min with lid. Sterile Whatman paper disc was dipped separately into the solutions.

C. Containing synthesized drug (200µg/ml) and standard drug ciprofloxacin (10mg/ml) in aseptic condition with the help of sterile forceps and placed on the surface in inoculated culture media after which the plates were kept in the refrigerator for 30min. for the diffusion of the compound from the paper disc into the culture media. After 30 min. the plates were incubated at 37^0C for 24 hrs. all the synthesized compounds were observed for antibacterial activity gram +ve & gram-ve species observations were recorded in tables by measuring the zone of inhibition in millimeter

RESULTS AND DISCUSSION:-

The purpose of this work was to know the synthesis and to obtain a Schiff base with high yield and to check antimicrobial activity. This was achieved by adopting the aforementioned method when Schiff base is prepared by reacting p-nitrobenzaldehyde with m- nitro aniline and form a Schiff base.

These newly synthesized compound were characterized by IR spectroscopic analysis, UV spectroscopic, their % yield, TLC and antimicrobial screening were also recorded. By these observations, this synthetic method proved beneficial for the synthesis of Schiff base.

The results of the synthesized Schiff base are given as follows:

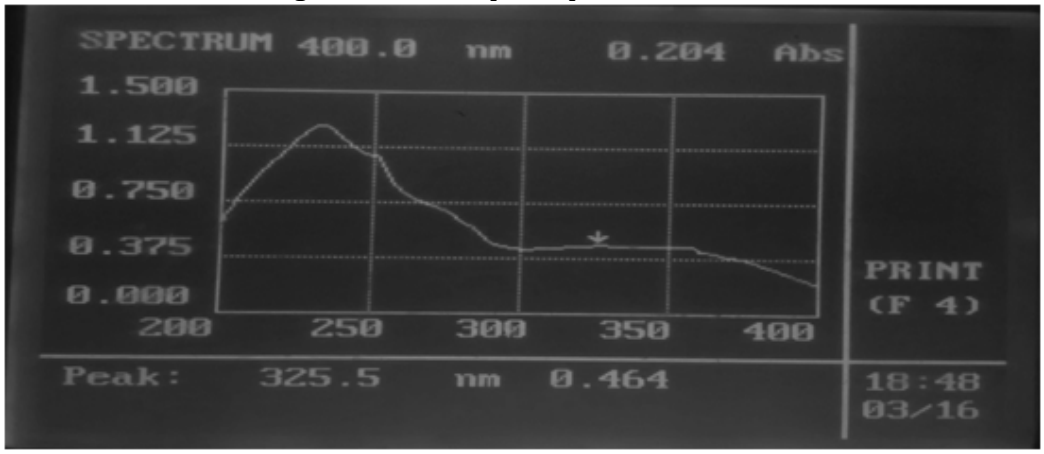
Table.No.2:- Results of Schiff base

Sr. No.	Compound	Yield (%)	Reaction Time (Min)	Melting Point $^oC^a$	Rf Value[b]	$\lambda_{max}{}^c$	vC=N vibration for Schiff base [d]
1	1-nitro -4 (1-imino,4-nitrophenyl) benzene	97.60	240	119-122	0.62	325.5	1685.79

[a] All melting points were uncorrected.
[b] Mobile Phase [Toulene: methanol: glacial aceticacid=8: 2: 0.3]
[c] λ_{max} were measured in ethanol AR grade.
[d] Expressed in cm^{-1}; KBr.

Spectral data of:1- nitro - 4(1-imino,4-nitrophenyl) benzene
Ultraviolet-Visible spectroscopic studies
UV Spectra of Schiff Base:-

Fig.No.1:- UV absorption spectra Schiff Base



λ max= 3λ max= 325 .5 nm (In Ethanol AR)

Rotational and vibrational studies:-

Fig.No.2:- IR spectra of Schiff Base

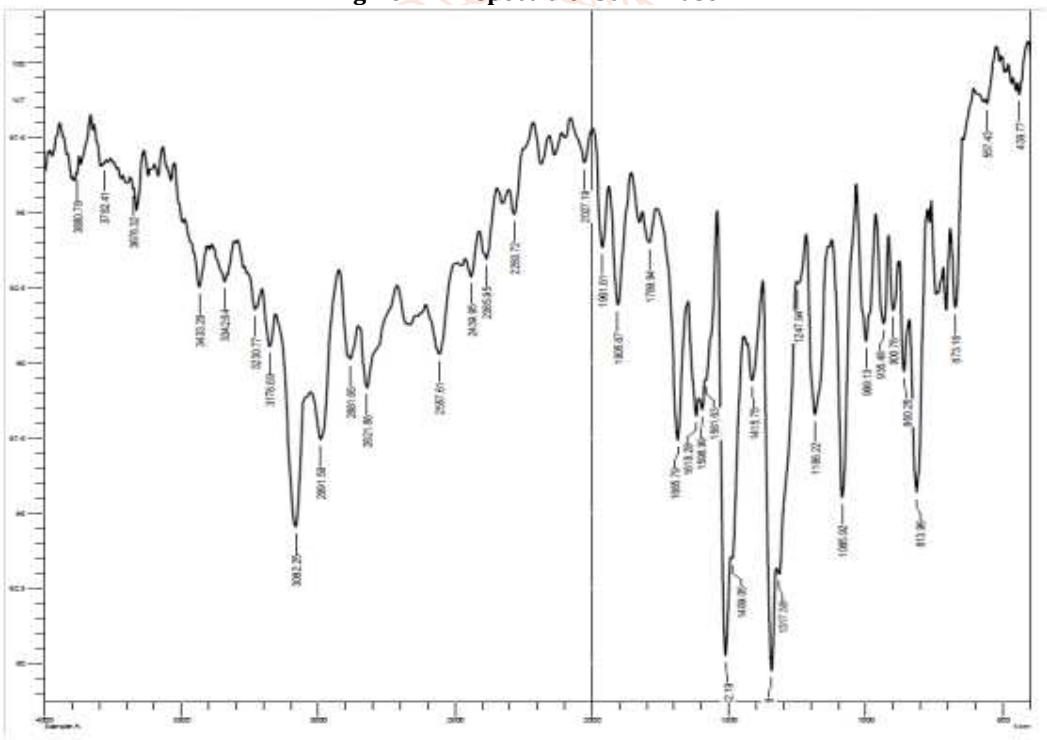


Table.No.3:- IR data of Schiff Base

Frequency cm^{-1}	Characteristic functional group
2.19	NO_2 stretching
3082.35	Aromatic - CH stretching
1685.79	(-C=N) stretching
813.96	-C-Cl stretching

ANTIMICROBIAL ACTIVITY:-

A series of some novel 5-substituted Schiff and Mannich bases of isatin derivatives, that is, 7-(4-((3-(4-(substituted benzylidene amino) phenylamino)-5-fluoro-2-oxindole-1-yl)methyl)piperazine-1-yl)-1-cyclopropyl-6-fluoro-4-oxo-1,4-dihydroquinoline-3-carboxylic acid, 1(a–l), were synthesized and characterized for in vitro antibacterial activity. Antimicrobial activity of synthesized compounds was assessed by minimum inhibitory concentration (MIC) in comparison with standard antimicrobial drugs, that is, ciprofloxacin and ketoconazole. Compound 1c was reported to be more active than both of the standard drugs against tested microorganisms which proves the significance of substituted electron-donating groups in improving the antimicrobial activity

Table.No.3:- Antimicrobial activity data of Schiff base

Zone of Inhibition (mm)		
Plate	Test	Standard (ciprofloxacin)
1	13mm	17mm
2	12mm	16mm

Fig.No.3: Zone of inhibition

Conclusion:-

As the compounds synthesized are characterized appropriately using IR spectra it is worth to synthesis aforementioned product by said method The objectives framed for the project were achieved with great success .We understood the synthetic pattern utilized for synthesis of Schiff base and their activity against microorganism.

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