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Microwave-Assisted Synthesis of Schiff Bases and Evaluation of Their Antibacterial Activities

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Abstract: a new Schiff bases was synthesized using microwave-assisted synthesis and conventional condensation with aromatic aldehydes. Microwave-assisted organic synthesis (MAOS) is the study of chemical reactions under the effect of microwave radiation. Microwaves radiation have high energy electric fields and will generally heat any substance containing mobile electric charges, such as polar molecules in a solvent or conducting ions in a solid. In resent year the synthesis of Schiff bases under influence of microwave irradiation was found much easier and faster than conventional heating. The synthesis in Microwave irradiation in solvent free or lower solvent conditions are good method for reduce the pollution, lowering the cost and increase the product together with simplicity in processing and handling.

Keywords: microwave, Schiff base, antibacterial properties.

1. Introduction

Microwave-assisted synthesis is green chemical method, the application of microwave-assisted is useful technology in organic synthesis because it is simple, sensitive, reducing the hazard, often possible to reduce reaction times to a few minutes under solvent free or lower solvent and increase the yields and easier work up as compared to conventional methods. In Schiff bases the carbon-nitrogen double bond (azomethine group) plays important role in synthetic reaction in organic chemistry and which imports in elucidating the mechanism of rasemination and transamination reactions in biological system. Schiff base ligands are considered “privileged ligands”because they are easily prepared by the condensation betweenaldehydes and imines. Stereogenic centers or other elementsof chirality (planes, axes) can be introduced in the syntheticdesign. Schiff base ligands are able to coordinate many

differentmetals [1–5], and to stabilize them in various oxidationstates. The Schiff base complexes have been used in catalyticreactions [6] and as models for biological systems [7,8]. Manycopper complexes of Schiff bases were prepared [9–14]. It hasbeen reported that the structure of the substituent bonded tothe imino nitrogen affects the coordination geometry of thecomplex [15]. During the past two decades, considerable attentionhas been paid to the chemistry of the metal complexes ofSchiff bases containing nitrogen and other donors [16–21]. Thismay be attributed to their stability, biological activity [22] andpotential applications in many fields such as oxidation catalysis[23], electrochemistry [24]. The complexes make thesecompounds effective and stereospecific catalysts for oxidation,reduction and hydrolysis and they show biological activity,and other transformations of organic and inorganic chemistry[25]. It is well known that some drugs have higher activitywhen administered as metal complexes than as free ligands[25]. In the present paper the conventional and economical microwave assisted synthesis of Schiff bases of Schiff bases.

2.Experimental:

All the chemical and solvents used were of A R grade and were used without furtherpurification.

Preparation of Schiff base legend (L):

The Schiff base ligand (L) was prepared by the following general method. This was done by thecondensation of 20ml of vanillin (0.03g, 10mmol) with 2-aminophenol (0.022g, 10mmol) inethanol (1:1molar ratio). The mixture was stirred for 4h.

Antibacterial Studies: Evaluation of antimicrobialactivity of all compounds *in vitro* was carried out by paperdisc method against bacteria including *E. coli, S. aureus, M.luteus, and B. lichenformis.* Ofloxacin was additionally testedas positive control.

3.Result and Discussion

Antibacterial Studies: Evaluation of antimicrobial activity ofall compounds *in vitro* was carried out by paper disc methodagainst bacteria including *E. coli, S. aureus, M. luteus, and B.lichenformis.* Ofloxacin was additionally tested as positivecontrol. The Disc Diffusion method [26], [27] was used todetermine the antimicrobial activities of the Schiff bases using standard procedure of 6 mm disc were prepared fromwhatman's filter paper no. 1. Silver nanoparticles coatedSchiff base solutions of varying concentrations ranging from100, 500, 1000 ppm was prepared. Nutrient agar was prepared,sterilized and used as the growth medium for the culture ofmicroorganisms; 20 ml of the sterilized medium was pouredinto each sterilized Petri dish, covered and allowed to solidify.16 hour old broth cultures of the specified microorganismswere used for testing antibacterial activity [28]. The sample,control

and standard treated discs were air dried at roomtemperature, to remove any residual solvent which mightinterfere with the determination, sterilized and inoculated.These plates were initially placed at low temperature for 1hour so as to allow the maximum diffusion of compoundsfrom the test disc into the agar plate and later incubated at37°C for 24 h in case bacteria [29], after which the zone ofinhibition could be easily observed. The data represent thevalues of three replicates and are evaluated as mean ± SEMvalues were determined and are shown in table 1. TheSignificance level of all compounds were (P<.001), (*P<.01).

The antibacterial activity was evaluated by tube dilutionmethod which depends on the inhibition of growth of amicrobial culture in a uniform solution of antibiotic in a fluidmedium that is favourable to its rapid growth in the absence ofthe antibiotic [30]. In this method minimum inhibitoryconcentration MIC of the test compounds was determined.

Their MIC values in then table 2.

Table-1: **Antimicrobial activity of AgNps anchored withSchiff base:**

Conc.(ppm)	*E. coli*(-)	*S. aureus*(+)	*M. luteus*(+)	*B. lichenformis*(+)
100	21(±.205)	20(±.450)	21 (±.209)	20 (±.205)
500	32(±.568)	32(±.016)	29(±.805)	28(±.548)
1000	38(±.650)	39(±.360)	36(±.036)	38(±.025)

Table 2: MIC value (in mg/ml) of silver nanoparticleanchored with Schiff base

E. coli(-)	*S. aureus*(+)	*M. luteus*(+)	*B. lichenformis*(+)
0.26	0.35	0.31	0.26

4.Conclusion

The Antibacterial activity of the synthesized Schiff base compounds was studied using disc diffusion method and the concentration was fixed using Minimum inhibitory concentration (MIC) method. The antibacterial study revealed that revealed that all compounds showed little to excellent activity as compared to standard drug Ofloxacin.

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