The condensation products of carbonyl compounds and primary amines are often named as Schiff bases. They are also known as **Azomethines** or anils or imines.

Schiff bases can be prepared by (i) the reaction of carbonyl groups with amino groups and related reactions, (ii) nitroso-methylene condensation. (iii) formation of oximes viac-nitro sations (iv) diazonium salt-methylene condensations (v) additions to carbon-carbon double or triple bonds (vi) through ylids (vii) tautomerization of amides and thioamides and related reactions (viii) addition reactions to nitriles, isonitriles, nitrile oxides and related compounds. (ix) oxidation and elimination from nitrogen compounds (x) reduction of nitro compounds (xi) rearrangements and photochemical reactions and (xii) electrochemical synthesis at lead electrode.

The condensation of primary amines with carbonyl compounds was first reported by Schiff **[1].** The reaction was reviewed **[4, 42].** The experimental conditions depend on the nature of the amine and the carbonyl compounds which determine the position of the equilibrium.

$$R'\text{-}CO\text{-}R + R''\text{-}NH_2 \longleftrightarrow RC\text{-}C = N\text{-}R'' + H_2O$$

Usually, it is advisable to remove the water as it is formed by distillation or by using an azeotrope forming solvent **[8,14,180].** This is necessary with diaryl or alkyl aryl ketones, but aldehydes and diakyl ketones can usually be condensed with amines without removing the water. Aromatic aldehydes react smoothly under mild conditions and at relatively low temperatures in a suitable solvent or without it. In condensation of aromatic amines with aromatic aldehyes, electron attracting substituents in the para position of the amine decrease the rate fo the reaction, while increasing it when on the aldehyde **[39].** In both cases a linear sigma-rho relationship was observed. With ketones, especially with aromatic ones, higher temperatures, longer reaction times and a catalyst are usually required in addition to the removal of water as it is formed.

The reaction is acid catalysed. However, only aldehydes and ketones which do not aldolize easily in acidic media can be condensed with amines in the presence of strong acid catalysts, e.g. concentrated protic acid **[31]** BF_3-etherate **[38, 188]** , $ZnCl_2$ **[2, 14, 15, 31, 43]**, or $POCl_3$ **[41].** For methyl ketones, only weak acids should be used, while for methylene ketones, which are less sensitive to acid-catalyzed aldolizations, stronger acids may be used as catalysts **[4].** Ultraviolet irradiation is reported **[15]** to promote the formation of azomethines from aldehydes. This is explained **[44]** as a light-promoted autoxidation of part of the aldehyde to the corresponding acid, which in turn act as catalyst. Schiff bases have also been prepared using piperidine **[183],** dimethylacetamide and 5% lithium chloride **[232]** and platinum group elements **[278]** as catalysts. Aromatic aldehydes and aliphatic or aromatic ketones give with the amines quite stable azomethines. Primary aliphatic aldehydes can give azomethines with various amines if the reaction is carried out at 0^oC, and the product is distilled from KOH **[9, 13].** The effect of solvent in the preparation of schiff bases was also studied as a function of the Reichardt E_TN and modified Kamlet-Taft B_KT parameters by Nagy et al **[266].**

The intranclear distance quoted for the >C=N- double bond is 1.29 – 1.31 A^0 for the non-conjugated group and 1.35 or 1.36 A^0 for azo-aromatic compound **[29].** Symth **[3,19]** estimated the dipole moment of >C=N- bond to be 0.9 D. Cottrell **[32]** calculated the bond energy for >C=N-bond from the original data of coates and Sutton **[10]** and found to be 147.0 K. cal/mole. Palmer's book **[33]** gave some detailed examples of the calculation of bond energies from thermochemical data and found to be 142.0 K Cal/mole.

The IR data found in the literature revealed that the acyclic >C=N – double bond most commonly encountered in Schiff's bases (azomethines) absorb in the 1690-1640 cm^{-1} region. In most cases it is a strong and fairly sharp band located at somewhat lower frequencies than the bands of carbonyl 1 groups and close to >C=C< stretching frequencies. In the absence of strain, steric hindrance or other complicated factors and in dilute solutions, prepared from neutral solvent, the stretching frequency of >C=N is found to be 1670 cm^{-1}. The corresponding force constant, 10.6 dynes cm^{-1} is in the harmonic oscillator approximation. If there are one or more groups conjugated with the >C=N- group the frequency is usually lowered. Generally speaking there is very little difference between infrared and Raman frequencies and between the spectra of pure liquids and solids and their solutions in CCl_4 or other not very associative solvents. In general > C=N- vibrations exhibit a lesser degree of localization then >C=O vibrations.

Little is known about the electronic spectrum of the C=N group itself in a purely aliphatic environment. Platt **[24]** sidman **[30]** estimated that π–n transition lies at 2100 A^0 if the > C=N- group carries only aliphatic substances, at 2500 A^0 if conjugated with a vinyl group and at 2900 A^0 if on a benzene ring. Much more is known about the spectra of compounds in which the >C=N- group is substituted by aromatic rings. Charette, Faltlhanal and Teyssie **[43]** studied the ultraviolet spectra of a series of N-Salicylidene alkyl amines and their aryl-substituted derivatives in different solvents. Spectacular changes occur when the inert solvents are replaced by hydrogen bonding solvents. Gawinecki, Ryazard et al prepared some schiff bases derived from ary1 groups and carried out the UV studies **[158].** Kinetics and mechanism of hydrolysis of Schiff bases were studied by pishchugin et al **[230,231].** Hydrolysis of various oxazolidines and N-acylated oxazolidines was carried out to exploure their suitability as potential prodrugs **[249],** Mahmoud et al reported the kinetics of hydrolysis of schiff bases and indicated that the rate-determining step is changed from –OH attack on the free Schiff base in alkaline media to attack by water on the protonated Schiff base in neutral and weakly acidic media. The results of study of solvent effects on base hyudrolysis rates suggest that specific solute – solvent interactions, Viz., dispersion forces and intermolecular hydrogen bonding play important roles **[251]** pramila and coworkers examined the rates of hydrolysis of Schiff bases at pH 4-13 in a 10% dioxane water system and in various non-ionic surfactant systems **[324]** angeles et al studied the hydrolysis of schiff bases in aqueous and non-aqueous media **[329].**

Determination of proton-ligand stability and stability of schiff bases were reported in the literature **[49, 57, 96, 97, 103, 125, 269, 290].** Salman et al **[330]** studied some new o-hydroxy schiff bases in four solvents using UV spectra and reported that the appearance and intensity of band at >400 nm which belongs to the keto form of the schiff base depends on the electronic and not the steric effect of the substituent. Potentiometric investigation of effect of the substituent.

Potentiometric investigation of effects of several electron donating and withdrawing substituents on the basicity of azomethine group of salicylidene aniline in nitrobenzene was carried out by Gunduz et al **[279].** Potentiometric study of some Schiff base ligands was reported by Bera et al and discussed the effects of hydrogen bonding and subsitutent effects on the stability constants and the proton affinities of nitrogen atoms in the schiff bases **[125].** Polarographic behaviour of Schiff bases has also been reported in the literature **[280]** Madhav et al **[317]** studied some schiff bases using HMDE, square wave and cyclic voltammetric techniques and explained the results in terms of electron withdrawing and releasing effects of the substituted groups. Effects of supporting electrolytes, solvents and acid concentration on salicylaldehyde tris schiff base have been studied polarographically by Sreenivasulu et al **[318].**

By virtue of the presence of lone-pair of electron on the nitrogen atom and of the general electron donating tendency of the double bond, compounds containing the azomethine group should possess basic properties. The most characteristic aspect of the compounds containing the >C=N- group which show basic properties lies in the formation of complexes with metals. These complexes provide some very characteristic series of coordination compounds. The basic strength of the >C=N group is inadequate by itself to permit the formation of stable complexes by simple coordination of the lone pair of electrons to a metal ion. Therefore, in order that stable compounds to be formed it is necessary that there should also be present in the molecule a functional group with a replacable hydrogen atom, preferably a hydroxyl group near enough to the > C=N- group to permit the formation of a five or six membered ring by chelation to the metal atom.

Physico-chemical studies of Metal-Schiff base complexes

A perusal of literature revealed that Schiff bases behave as monodentate, bidentate and polydentate ligands towards many metal ions in the formation of complexes. Metal chelates of azomethines mostly with transitional metals, lanthanides and rare-earths have been prepared and characterized using elemental analysis, conductometry, magnetic suscebtibility, thermal (TG, DTA, DSC), X-ray diffraction X-ray fluorescence, infrared, ultraviolet visible, mass, nuclear magnetic resonance, electron spin resonance and proton resonance spectra **[48, 51-54, 61-63, 68-72, 74-77, 84-95, 99, 105, 109, 113, 117, 123, 127, 132, 133, 136-139, 142-155, 167-182, 184-204, 206-209, 210-217, 220-223, 225-228, 256-259, 271, 292].**

The characterization of metal-Schiff base complexes synthesized electrochemically has also been reported **[254, 270, 307, 319, 325-327].** Formation of polynuclear and mixed-ligand copper (II) and nickel (II) complexes with schiff base envisaged in the literature **[261].**

Studies of metal-azomethine complexes in solution have been carried out by several authors. Metal-to-ligand ratio and stability constants for the complexes were computed using P^H metric and potentiometric **[49, 56, 58, 67, 71, 96, 99, 103, 106, 119, 122, 124, 126, 128, 135, 166, 205, 268, 279, 289, 302, 304-306]** Spectrophotometric **[47, 59, 79, 78, 121, 166]** and conductometric **[313]** techniques.

Solvent extraction, thin layer chromatography and spectro- electrochemical studies were carried out to study Cu[II], Zr [IV], U[VI], Co[II] and Th [IV] schiff base complexes **[50,100,165,200].** Schiff bases were also used in the fluoremetric determination of beryllium **[195]** and aluminium **[244].** Aoki et al studied the effect of metal-to-ligand ratio on fluorescence properties of Zn (II) and Be (II) schiff base complexes **[267].** The same authors have also determined ethylenediamine fluoremetrically by forming a fluorescent Be (II)- Schiff base complex **[303].**

Polarographic technique has also been employed by various authors in the study of metal-azomethine complexes to determine coordination number, stability constants, kinetic parameters and stereochemical behaviour in solution. For reversible and irreversible system **[7, 50, 66, 101, 103, 104, 107, 108, 110, 115, 118, 120, 127, 129, 130, 156, 152-155, 189, 217, 219, 250, 253, 260, 286, 312, 315, 331].**

Applications of Schiff bases and their metal complexes

The >C=N- group is present in many organic molecules of fundamental importance. They have got extensive applications in biological and industrial fields. Schiff bases with potential pharmaceutical use were synthesized **[20, 22, 36].** Anticataract pharmaceutical Schiff bases have been reported by Elsmer et al **[254].** Azomethines prepared by Nakahara and his coworkers were used as catalysts providing dental composites with excellent hardness, adhesion, on dentin and enamel, and discolouration resistance **[263].** Thirty seven pharmaceutical anils were reported in the literature possessing anti inflammatory, antipyretic and analgesic properties **[64].** Neomycin derivatives were recovered by converting them to Schiff bases with aromatic aldehydes at pH <7.0. These Schiff bases themselves are useful in human and veterinary medicine **[37].** A potentcy of 725 streptomycin units/mg was reported for a number of Schiff bases prepared from salt of streptomycin **[36].** Compounds of pencillin with Schiff bases of amphetamine were reported **[17].** Therapeutically effective Schiff bases exhibiting. Cardiotonic and diuretic actions have also been prepred **[6,28,88].** Schiff bases having anti inflammatory property have been synthesized **[33,277,194].** Sivam et al prepared some pharmaceuticals containing Schiff base **[299].** Some schiff bases on expected chalogogic and choleretic activity were synthesized **[287].** Tanaka et al **[234]** prepared some Schiff bases useful as raw materials for drugs, agrochemicals and electron devices by reduction of them with molecular hydrogen in presence of palladium containing catalysts and tertiary amines.

Antiviral active anils were prepared in presence of zinc and acetic acid by Auelbekov et al **[196].** Irridium (III) Schiff base complexes also behaved as antivirucides **[265].** Substituted salicylaldehyde Schiff bases of 1-amino-3-hydroxy guamidine tosylate acted as antiviral agents against coronavirus **[249].**

Fifty seven Schiff bases used as anticancer agents were reported by chaudari and his coworkers **[79].** Anticancer activity of Schiff bases was also cited in the literature **[131].** Schiff bases of uracil-6-carboxaldehyde were synthesized and evaluated as potential antitumour agents by kiwet al **[332].** Metal-Schiff base complexes studied by Zishen et al also exhibited anticancer activity.

Complexes with bidentate Schiff bases were reported to possess biocidal activity against bacteria and fungi **[164].** Singh and his coworkers synthesized some boran complexes with Schiff bases and found to possess antifungal and antibacterial activity **[288]** Schiff bases derived from methyl cyclo propyl ketones on addition with dialkyl phosphites showed aphicidal activity **[300].** Twenty- six thiazole schiff bases and their derivatives prepared by Mahapatra showed antifungal activity against curvularia species **[183].** The antifungal property of some nickel-Schiff base complexes was studied. The complexes were more active than the free ligands against all the fungi tested **[252].** Fifteen transition metal complexes with three Schiff bases have been screened against some fungal pathogens. Amoung these, Cu (II) and Co(II) complexes with one of the three Schiff bases, namely benzil- touldine ligand showed high fungi toxic results **[291].** Schiff bases derived from 5-nitro and 5-chloro salicylaldehyde and their complexes with Mn (II) Fe (III), Co (II),Ni(II) and Cu(II) have been studied for fungicidal activity using the growth method **[273,285].** A series of sixteen methylated polyfluoro aromatic Schiff bases and their salts were tested as acaricides, fungicidies and insecticides. Fluorination on the aldehyde part of the molecule enhanced the insecto acaricidal activity over that caused by fluorination on amine part **[240],** Schiff base obtained from tris and glyoxal was studied for its pesticidal activity by Nicolae et al **[157].** Pesticidal active phose phonium salts of C-phosphorous (III) substituted azomethines were synthesized **[314].**

Schiff bases possessing herebicidal activity were prepared by sinha et al **[272].** Azomethines were also used as starting material and intermediates in the preparation of herbicides **[236,237].** It is found that Schiff bases have been employed as growth regulators **[80].** D'Amico prepared six Schiff bases and found to be useful as plant growth regulators. Schiff base of aminohydroxy tetrahydro naphthalene was found to possess growth regulating activity **[198].**

Growth regulating activity of Schiff bases on cucumbers and tomatos **[239]** have been studied. Some azomethine compounds used as growth stimulants were also reported **[197].**

Mixtures of linear poly Schiff bases of low molecular weight were synthesized from aliphatic diamines and terephthaldehyde **[23].** Soluble and insoluble polymeric Schiff bases were synthesized and their Co (II), Cu (II) and Ni (II) complexes were characterized **[141].** Cross linked polymers from Schiff bases have been derived and reported by Barbara and his coworkers **[241].** Al-Dujali et al synthesized liquid crystalline poly Schiff base polymers **[308,309].** Polymers of azomethine group containing (meth) acrylate esters were prepared by Ohashi et al **[328,329]** and used for second harmonic generation devices in opto-electronics.

Mixtures of azomethines and diazomethane pigments were used for PVC, printing inks and coatings with good migration resistance **[73,111].** Azomethines and their metal complexes with Cu(II) Ni(II), Zn(II) and Co(II) reported by Hunger were used as pigments **[116].** The Schiff base derived from salicylaldehyde and diaminomaleonitrile and its metal Complexes were used as pigments **[111,242].** Some azomethine transitional metal chelates useful as pigments for plastics were also cited in the literature **[64].** Theodar **[82]** synthesized fast greenish yellow to bluish red diazomethane pigments. Azomethine – metal complexed pigments from bibenzyl series have been prepared **[310].**

Paints containing drying oils with conjugated double bonds and Schiff bases were reported **[27].** Property of Schiff bases increasing the drying rate of paints was cited in the literature **[26].** Schiff base compounds useful for electrophoretic coating **[264]** and corrosion inhibitors **[275,334]** were also reported.

The copper complexes of Schiff bases derived from phenolic aldehydes with aliphatic diamines were used as good light stabilizers for dyed and undyed polyamide fibres **[297].** In photography, a yellow Schiff base was used in irreversibly dischargeable photographic filter and antihelation layers as filtering agents **[18].** Anils formed yellow styryl dyes particularly useful for colour correction masks for the cyan layer of colour film **[21].** Photographic developers incorporating azomethine group were also described **[11].** Certain Schiff bases of dialdehyde and diamino compound, when mixed with gelatin were used as colour filter in making colour films **[12].** Schiff bases prepared by Mariko and Sadao showed good miscibility in various resins, have good solubility and were used in the charge transferring layer of electro photographic photoreceptors **[233].** Substituted azomethines were also employed in the coating of electro photographic paper **[35].** Some cationic technetium complexes of Schiff base ligands were studied as myocarial imaging agents **[235].**

Schiff base compounds useful as aroma and taste enhancers in perfumes, cosmetics, food stuffs, chewing gums and beverages were prepared **[276, 283, 284].** Schiff bases derived from amines and organoleptically acceptable aldehydes were employed as deodorants for removing aldehyde associated off flavour in fats, oils **[298]** and odourous air from refrigerators or raw garbage **[282, 316].**

Schiff bases were used as catalysts in accelerating the formation of the factice **[16, 63, 83].** Organic compound containing an azomethine group was used as a catalyst for the polymerization of H_2CO in an inert medium **[38].** The catalytic and oxidative activites of azomethines and their corresponding copper, nickel chelates were discussed by Aptekar et al **[55].** Rhodium-salicylidene complexes and nickel-azomethine complexes used as catalysts for isomerization and dimerization of $\propto$ olefins respectively were reported **[65, 83].** The liquid phase oxidation of 2,3,6 trimethylphenol to 2,3,6- trimethyl-p-quinone with molecular oxygen catalyzed by metal-Schiff base complexes was performed in various solvents by Mizukami et al **[185].** Titanium [IV] Schiff base complexes were employed as catalysts in the oxidation of thianisole **[245].** Optically active quadridentate Schiff bases and their titanium [IV] complexes were prepared by Caori et al and employed as catalyst in the asymmetric oxidation of methyl phenyl sulphide with organic hydroperoxides **[321].** Ring opening reactions of epoxides with trimethylsilyl cyanide catalyzed by titanium alkoxide-Schiff base complexes were studied by Hayashi et al **[333].** Catalytic dehydrogenation of hydrozones to diazo compounds was carried out with cobalt-Schiff base complex-oxygen system **[243].** Catalytic efficiency of cobalt [II] complexes of tetra and quinque dentate Schiff base ligands had been tested towards the oxidation of 2,6 di-tert-butyl phenol by molecular oxygen **[260, 281].** In the oxidation of 3,5 di-tert-butyl catechol to 3,5 di-tert-butyl quinone, complexes of UO_2[II] Cu [II] and Ni [II] with compartmental schiff bases were used **[224].** Srinivas et al prepared Ni [II] and Co [II] complexes which are less active than their Cu [II] analogs and used as catalysts in the oxidation of 3,5 di-tert-butyl catechol by O_2 **[320].** The mechanism of oxygen binding by cabalt [II] complexes with bidentate Schiff bases was considered by Vogt et al **[186].** Palladium complexes of Schiff bases derived from heterocyclic aldehydes were used as catalysts for the hydrogenation and isomerization of allyl benzene in methonol in presence of $NaBH_4$ **[262].** Stable peroxo Schiff base complexes of thorium **[293]** and ziroconium **[294]** were tested for their catalytic activity. Bis (salicylidene) –1,2 diaminocyclohexane-Mn [III] complex was synthesized and its catalytic property was studied **[296].** Cobalt-Schiff base complexes were used as metal complex carriers of oxygen **[186,295].**

In addition to the above mentioned applications, Schiff bases have been employed in preparative uses (e.g. heterocyclic compounds) **[301]** for the identification, detection and determination of aldehydes or ketones, for the purification of carbonyl or amino compounds (amino acids in protein hydrolysates **[5],** or for the protection of these groups during complex or sensitive reactions (e.g. amino acids during peptide synthesis) **[42].** Primary amines were determined by Fluorescent high performance liquid chromatography and chemiluminescene flow injection methods after coverting them as Schiff bases **[311,322,323].** The condensed product of salicylaldehyde with o-amino phenol was used as a gravimetric reagent for copper (II) **[81].** Metallic impurities, such as copper from petroleum products were removed using Schiff bases **[25].** In bioprosthetic tissue, residual aldehyde levels, which when high may cause implantation problems such as inflammation and other adverse reactions, were reduced in the form of Schiff base by contacting the tissue with a rinsing solution containing a primary amine **[274].**

Perusal of literature revealed that not much work has been carried out in establishing the complexing ability of **2-Amino-2-Methyl-1-Propanol (AMP),** towards metal ions. Even the available few references on metal complexes of AMP not fully established the coordinating ability of AMP towards metals, but only emphasized the applications of those complexes in biological fields. Metal complexes prepared by the reaction of tetrachloroaurate with AMP in aqueous media were recommended as antitumor agents **[201].** Werner coordination complexes **[134]** prepared by reacting benzotriazole with a monoepoxide to form a mixture of 1 and 2-hydroxy alkyl benzotriazoles and esterifying mixture with an alkaline succinic anhydride to form a monoester and converting the monoester to a salt of metal selected from IB, IIB, IVB and VII of the periodic table and complexing the salt with alkanolamines including AMP form a chelate. The chelate thus obtained was employed as detergent and anti wear additive for lubricants. Structural and bonding properties of Cu (II) complexes in presence of AMP employing X-ray crystallographic techniques have been reported. Muhonen et al. Studied the magnetic properties of (2-amino-2-methyl-1-propanolato) chloro copper (II) and bromo Copper (II) tetramers **[140].** The studies on Ni (II) complexes with AMP and other alkanolamines have been carried out by using potentiometric method. pH-titration method is also employed in studying the Ni (II) (substituted alkanolamines) systems and relative stabilities reported in the literature **[144].** The electrochemical behaviour of Copper (II) complexes of five aminoalcohols including 2-amino-2-methyl-1-propanol (AMP) were studied **[145]** in aqueous solutions by maintaining pH (10.5-13.0). Exchange interaction in a linear tri nuclear Copper (II) cluster complex with a single oxygen bridge between neighbouring Copper (II) ions using AMP as a ligand have been reported **[246,**

247]. The stability constants and molar absorptivities of complexes of Copper (II) with AMP in aqueous medium were determined employing Spectrophotometric method **[248].** Speciation of Copper in presence of AMP as complexing agent has been studied by DC Polarography and Differential Pulse Polarographic techniques **[335].** Complex formation equilibria of heavy metals (Cd, Pb and Hg) with aminoalcoholic biological buffers have been discussed **[337].** A Potentiometric study of zinc (II) complexes and spectrophotometric study of Copper (II) complexes with AMP in aqueous media has been reported **[338,339].** Polarographic study of Copper (II) and Cadmium (II) complexes in presence of substituted alkanolamines including AMP has been reported **[60,114].** Synthesis, Structural, Magnetic and Spectral properties of alkanolamine complexes of Pt, W, Ni, Ag, Au and Zn have been reported **[144, 159, 201, 202, 336, 338].** A determination and correlation of stability constants of various Copper (II) complexes with ethanolamines, the isopropanolamines and 3-hydroxy substituted amines of AMP and ethanol propanolamines have been reported **[46].** The synthesis, structural and catalytic ethylene oligomerization behaviour of Nickel complexes with substituted diphenyl phosphinomethyl oxazoline has been studied by Braustein etal **[340].** Polarographic investigation of Cu and Cd metal ions in presence of aliphatic hydroxyamine (2-Amino- 2 –ethyl-1,3 Propanediol) has been carried out by Sudhakar Babu etal **[341, 342].** Han Dong Yin and Shao Wen Chem mainly focused on synthesis and characterization of organo tin(IV) compounds with Schiff base of O-Vanilin-2-thiophenylhydrazone. **[343].** A binucleating tetra-dentate Schiff base ligand, bis (O-Vanillin)benzidine (O-$v_2$bzHz), and its seven new binuclear complexes have been synthesized and characterized on the basis of elemental analysis, IR, NMR, Electronic, Magnetic, Thermal studies and conductance measurements. The 3D molecular modeling and analysis for bond lengths and bond angles have also been carried out by Mourya et al **[344].** Spectroscopic analysis on interaction of O-Vanillin-D-Phenylalanine, o-Vanillin-L-Tyrosine and O-Vanillin-L-Levodopa Schiff bases with bovine serum albumin (BSA) has been investigated by Gao J and Wang J and et.al **[345].** New Schiff base derivatives (L_1 and L_2) were prepared by the condensation of 2-hydroxy-3-methoxybenzaldehyde (O-Vanillin) and 3-methoxybenzaldehyde (Iso-Vanillin) with 5-methylfurfurylamine. Two complexes $[Ni(L_1)_2]$ and $[Cu(L_1)_2]$ have been synthesized with bidentate NO donor Schiff base ligand (L_1). The Ni(II) and Cu(II) atoms in each complex are four coordinated in a square planar geometry. Schiff bases (L_1 and L_2) and complexes $[Ni(L_1)_2]$ and $[Cu(L_1)_2]$ were characterized by elemental analysis, FT-IR, UV-Vis, Mass and ^{1}H, ^{13}C-NMR Spectroscopies. The crystal structures of the ligand (L_2) and complexes $[Ni(L_2)_2]$ and $[Cu(L_2)_2]$ have also been determined by using X-ray crystallographic technique has been reported by Cemal Senol abd et al **[346].**

Synthesis and spectroscopic characterization of Mo(VI) and VO(IV) new Schiff base metal complexes in addition the authors have been screened the compounds for biological activity have been reported by J.Sreeramulu et al **[347].** Synthesis and characterization of a novel Schiff base derived from 2,4,6-trimethyl-m-phenylenediamine with o-vanillin and its metal complexes has been reported by Siti Najihah Abu Bakar and et al **[316].** A new tetranuclear copper(II) Schiff base complex containing Cu₄O<4</sub> cubane core: structural and spectral characterizations has been reported by Shit, Shyamapada and et al **[349].** The new azomethine compounds derived from 2-amino-6-methylpyridine and 2- hydroxy-3-methoxy benzaldehydes (OVAMP) have been reported for the first time by Begum and Sreeramulu **[350].** Synthesis, spectral characterization and biological activities of Organotin (IV) complexes with Ortho-Vanillin-2-hydrazinopyridine (VHP) has been reported by N.Sam and et al **[351].** Srinivas Prepared Zn(II) metal complexes by the reaction of Pthalaldehyde with AMP in aqueous methanol media were recommended as anti bacterial agents **[352].**

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