CHAPTER – 1
INTRODUCTION

1. GENERAL INTRODUCTION

Coordination compounds, which are the strong base of inorganic chemistry, are now of great importance not only in organic chemistry and analytical chemistry but also in bio-inorganic chemistry, and thus it can be truly considered as interdisciplinarity in nature several publications varying from purely scientific to modern physico-chemical and to biochemically relevant coordination compounds, reveal the creating anxiety in this branch of chemistry. The works, reported by Tassaert(2005) was the very beginning of development in coordination chemistry. The systematic approach on the study of coordination- complexes was first done by Alfred Werner in 1893.

The structural aspects of metal-nitrogen bonded compounds occupy prominent positions amongst the recent achievements are clear in the field of coordination-chemistry. The multidentate ligands, with phenolic oxygen and imine like nitrogen donors, can serve as models for biologically occurring protein bound metal complexes. Cytochrome c, a coordination compound of iron, present in fish, terrestrial vertebrates and in some green plants, is oldest chemicals involved in biological processes. Haemoglobin which is also a coordination compound of iron having porphyrin ring with N donors is an essential component of blood. Other important coordination- compounds are given by nature, chlorophyll vitamin B$_{12}$ and various enzymes.

Chlorophyll is a magnesium complex which is main component present in green plants for the photosynthesis in plants. A Vitamin which is cyanocobalamin is a cyanocobalamin complex with 5,6- dimethylbenzimidazole as the nitrogenous base was first elucidated by Hodkin et. al. in 1948.

Cytochrome c oxidase consists of haeme groups and copper atoms in (1:1) ratio. The first enzymes of this type in which copper was detected were the trustiness. Haemocyanin or blue blood which contain a cuproprotein, present in lower species, e.g. snails- crabs also functions as oxygen suplier like haemoglobin. Zinc complexes are found to be present in more than seventy enzymes of the classes aldoses,
dehydrogenases, peptidases, phosphates etc. Various perplexities such as isolation of elements with very many similar properties, elimination of incorporated excess metals from organisms have been eradicted the metal chelates who are stable the formation of stable metal chelates. The same employed for cleaning of thermal power engineering equipments. Selective metal derivatives of the complexions such as cyclohex-1, 2-ethylenediaminetetraacetic acid (CDTA), diethylenetriaminepentaacetic acid (DTPA), ethylenediaminetetraacetic acid (EDTA) etc. are not only very useful but very important for theses purpose. Complexes of these types are using for the separation and filtration of toxic metals from the body as well as in the removal of radioactive compounds from various contaminated surfaces one interesting example is D-Penicillamine, HIS(CH$_3$)$_2$CH(NH$_2$)COOH, the chelates for the cure of Wilson’s disease (hepamenticular degeneration), a disease comes from parents and go through next generation involving the excessive build up of copper- complexes in the body.

The present investigations deal with the synthetic studies on bivalent metal complexes using cobalt (II), copper (II) and zinc (II) acetates and Schiff- bases derived by nucleophilic- addition of asy-triazine and S-triazoles to aldehydes.

SECTION 1.1 TRIAZINE

SECTION 1.2 TRIAZOLES

SECTION 1.3 SCHIFF BASES

**Triazine** is a six-membered heterocyclic compound having three C atoms and three N atoms in the ratio of 3 ratio 3 depending on the positions of nitrogen atoms in the heterocyclic ring, triazine compounds are classified as 1, 2, 3-triazine or V-triazine or β-triazine (I); 1, 2, 4-triazine or asymmetrical triazine (as-triazine) or α -triazine (II) and 1,3, 5-triazine or γ-triazine oror symmetrical triazine (s-triazine) (III).

**Triazoles** are the compound which contain 5 atoms in a ring in which must N .Five membered heterocyclic compounds containing one or more hetero atoms in their ring, Minimum 1 of which must be nitrogen. These catagorised in the following 2 different forms i.e. 1, 2, 3- triazoles or vicinal (v) triazoles and 1, 2, 4 or symm. (s) triazoles.

**Schiff- bases** have constituted an important class of nitrogen donor ligands, elucidated by Schiff in 1864, which has been witnessed by the publication of several review articles on the different- aspects of Schiff- base derivatives.
A Schiff-base is a compound formed by the nucleophilic-addition of primary-amine to an active carbonyl compounds either an CHO or a ketone. The normal skeleton of Schiff-base is

Where R, R' and R" = Alkyl, Aryl, Cyclohexyl or hydroxy alkyl gps.

The important characteristics of Schiff-bases are

(i) An azomethine gp.( >C = N– )
(ii) Contain lone pair of electrons on the nitrogen atom.
(iii) The double bond having electron donating nature.

2. WORK DONE ON BIVALENT METAL COMPLEXES:–

The complexes of 4-amino-3-(o-hydroxy-phenyl)-1, 2, 4-triazoline-s-thione and 3-(o-hydroxyphenyl)-4-(o-hydroxybenzy-lidene)-1, 2, 4-triazoline-5-thione with Mn-(II), Co-(II), Ni-(II) and Cu-(II) have been synthesized and characterized. The complexes are reported to have octahedral-geometry except Cu-(II) complexes which is square planar. Sinha et al have obtained 4-amino-3, s-dimercapto-1, 2, 4-triazole and its metal-complexes with Ni-(II), Co-(II), Cu-(II), Zn-(II), Cd(II) and Pd(II) and characterized them according to of I-R, U-V and magnetic moment studies. The complexes of Cu-(II), Ag-(I), Tl-(I), Zn-(II) and Cd-(II) of 4-amino-3-ethyl-s-mercapto-1, 2, 4-triazole and 4-amino-3-ethyl-s-mercapto-1, 2, 4-triazole have also been reported Dubey. Handa and Vaid have reported. The synthesis of 4-amino-s-mercapta-3trifluoromethyl-s-triazole and their Co-(II), Ni-(II) Cu-(II), Zn-(II) and Cd-(II) complexes and characterization on the basis of elemental-analysis, I-R, electronic-spectral-data and magnetic-susceptibility measurements.

3. PRESENT STATUS OF WORK:–

The formation Triazine, Triazole and Schiff-base has been studied. Their coordination behaviour towards bivalent metal ions Ni-(II), Co-(II), Cu-(II), Zn-(II), Cd-(II) and (II) investigated. The bivalent organometallic-complexes with Schiff-ligands have explored by UV, IR, elemental analysis, electronic-spectral-data and magnetic movement measurements.

4. OBJECTIVE AND ITS SCOPE:–

New pyridazine derivatives are involved in biological activity which may be involved more. Some complex like (PTC 124) already synthesized used for the suppression of
non-sense codon complexes are using F.T.-IR and NMR spectroscopy and elemental analyses.

New synthesis like PTCK4 is used INCL (Infantile neuronal ceroid lipofuscinosis) a lethal hereditary neurodegenerative lysosomal storage disorder affects mostly children. Some compounds like LAMA3 and R943X is used for nonstoping the translation .

5. PLANNING OF WORK:

The main purposes of the thesis are:

(a) Synthesis of Schiff- bases having triazine and triazole compounds.

(b) To explore the metal-complexes formation nature of these Schiff- ligands with bivalent metal ions eg.- Co-(II), Cu-(II), Zn-(II) and Ni-(II) and preparation and properties synthesis and bivalent metal complexes of cobalt- nickel- copper - zinc with the following new Schiff- bases.

1. 5-Mercapto-3-methyl-4-(p-chloro benzalidene amino)-S-triazole (MMCBT) (C_{10}H_{9}N_{4}CIS)
2. 5-Mercapto-3-methyl-4(2'-acetophyridine amino)-s-triazole (MMAPT) (C_{10}H_{11}N_{5}S)
3. 5-Mercapto-3-methyl-4(2:5-Dinitro acetophenone amino)-S-triazole (MMNAT) (C_{11}H_{10}N_{6}O_{4}S)
4. 3-Ethyl-mercaptopo-4-(p-chlorobenzalidene amino)-s-triazole (EMCBT) (C_{11}H_{11}N_{4}CIS)
5. 3-Ethyl-5-mercaptopo-4-(2-Acetopyridine amino)-S-triazole (EMAPT) (C_{11}H_{13}N_{5}S)
6. 3-Ethyl-5-mercaptopo-4-(p-methylacetophenoneamino)-S-triazole (EMMAT) (C_{13}H_{16}N_{4}S)
7. 3-Ethyl-5-mercaptopo-4-(2:5-Dinitro aceto phenone amino)-S-triazole (EMDNAT) (C_{12}H_{12}N_{6}O_{4}S)
8. 5-mercaptopo-4-(p-chlorobenzalidenmino)-3-n-propyl-S-triazole (MCBPT) (C_{12}H_{13}N_{4}CIS)
9. 5-mercaptopo-3-n-propyl-4-(2-Acetopyridineamino)S-triazole (MPAPT) (C_{12}H_{13}N_{5}S)
10. 5-mercaptopo-3-n-propyl-4(p-methylacetophenone-amino)-S-triazole (MPMAT) (C_{14}H_{18}N_{4}S)
11. 5-mercapto-4-(2:5-Dinitro acetophenone amino)-3-n-propyl-S-triazole (MDNAPT) \( \text{C}_{13}\text{H}_{14}\text{N}_{6}\text{S} \)

These compounds have been characterized on the basis of elemental analysis; electronic IR and PMR-spectral studies.

6. IMPORTANCE AND UTILITY OF WORK:

Some compounds like Vulcan XC-72R are prepared by modified polyol reduction for low-temperature fuel cells. Yet more compounds may be synthesised. Some compounds illuminate into lucifires in biology. This work has the importance in chemical industries and in biological world. Recently discovery is using in GMA in ultra sound and in other human welfare. Recently it is also using in cancer treatment like prevent the growth Inhibition of human thyroid Carcinoma and Goiter cell. New synthesis will be benefited in the living world of animals and plants.