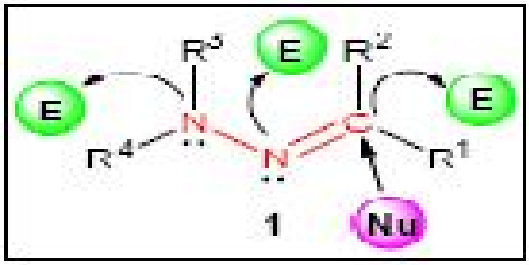
CHAPTER 1

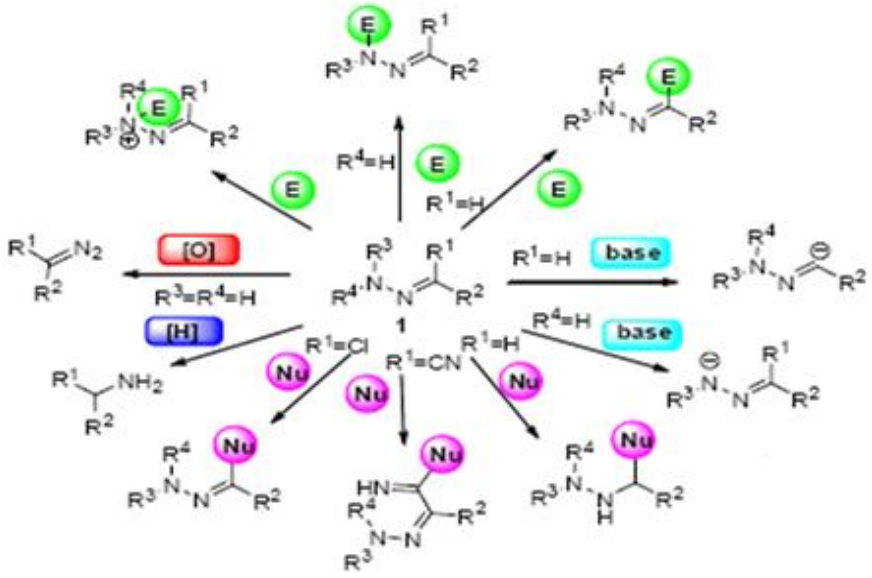
INTRODUCTION

1.1 Introduction of analytical organic reagents

Hydrazones are very important group of analytical reagents for the determination of various metal ions or inorganic anions quantitatively by the formation of stable colour or precipitate or insoluble complex. Hydrazones are consist active carbon site which undergo dual action such as Electrophilic and Nucliophilic action. Because of this dual nature of carbon it undergo both Electrophilic reaction and Nucliophilic reaction and also contain 2 nitrogen atoms, both are active and reactive by the following Nucliophilic reactions. Because of these characteristics, hydrazones are considered to be important classes of analytical reagents and considered widely as a reagent.



E = Electrophile
Nu = Nucleophile



Depends on reagent reactivity, reagents are broadly classified as colorimetric and gravimetric reagents. In both cases chelating property was observed for the determination of different metal ions in divergent samples. Required chromogenic reagents form colour complexes to posses the functional groups capable of coordinating with the metal ion concentrated to form stable and coloured metal complexes.

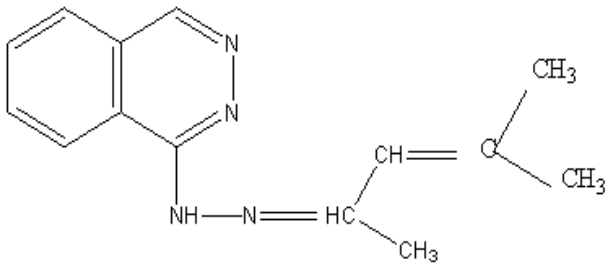
In the preparation of Hydrazones some important class of drugs was derived. The Oxygen present in –CHO is replaced with H_2NN, which is used for the synthesis of Azomethine (NHN = CH–).

Hydrazone is a condensed product obtained from the reaction between hydrazide with (–CHO) aldehyde to form the hydrazone.

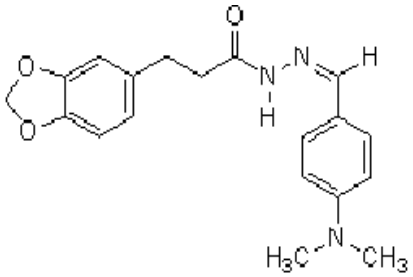
$$RCHO + H_2NNHC(=O)R \rightarrow RCH=NNHC(=O)R$$

The compound of Hydrazones have biological importance, which is interested many scientist in the field of antituberculosis, antimicrobial and antitumor activities. In inorganic chemistry hydrazones play an important role because of formation of stable complexes easily with the most of the metal ions. Aroylhydrazones forms coordination compounds and these are act as enzyme inhibitors and these are very useful because of their applications in pharmalogical area.

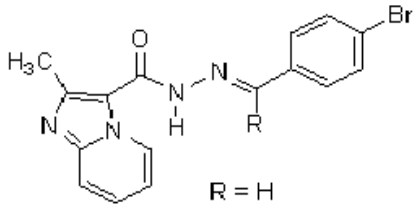
Hydrazones contain an Azomethine (–NHN=C<u>H</u>–) proton, this is useful for the new drug development. Because many researchers have synthesized these compounds as target structures and evaluated their biological activity. Mesityl oxide - 1- phthalazinyl hydrazone[1] shows the Anti pertensive activity, N-acylarylhydrazone show the analgesic activity, pharmacophore acyl aryl hydrazone moiety gives good and persistent anti-inflammatory activity and 3,4-methylene- dioxybenzoyl-2-thienyl hydrazone shows the Vasidukatir activity. Structures of above compounds are shown below.



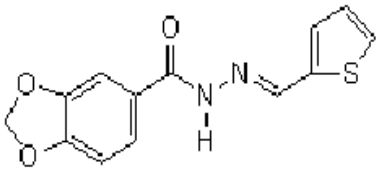
Mesityl oxide -1- phthalazinyl hydrazone



N-acylarylhydrazone



pharmacophore acyl aryl hydrazone



3,4-methylene- dioxybenzoyl-2-thienyl hydrazone

Numbers of analytical techniques have been reported such as cyclic voltammetery, Absorption spectroscopy, ICP-MS, ICP-AES and spectrophotometry for the determination of different metal ions. For the determination of metal ions in various samples like water, pharmaceuticals, alloys, soil, environmental real samples, various hazards etc., spectrophotometry method is good tool due to its adaptability, simplicity and low cost.

The main aim of the present work is mainly focused on the development of sensitive, selective, direct and derivative spectrophotometric determination of metal ions in different samples of significantly importance. Spectrophotometry is popular due to its simple procedure and widely availability of instrumentation in addition to accuracy, precision and speed results, because it is widely employed analytical technique. The advantage of new generation spectrophotometers equipped with handling, use of microprocessors in data acquisition and diode array detectors have brought about dynamic progress.

1.2 A brief review on Derivative Spectrophotometry

The researches are great interest in different fields towards derivative Spectrophotometry (DS) due to spectral bands resolution increases, can find out impurity easily and location of the wavelength of poorly resolved components of complexes spectra and to shut out effect of interference on spectral backgrounds. Because researches are showing their interest on segregation and pre-concentration of vital components usually required in quantitative and qualitative spectrophotometric methods.

Derivative Spectrophotometry is widely used in different fields such as amino acid, Proteins in biochemical samples, analysis of pharmaceutical products, analysis of food in environment chemistry, analysis of pharmaceutical products, Inorganic-Organic analysis and Toxicology-Clinical analysis. In general the applications of DS are not restrained to any one specific sector or field. But it is able to used to decrease difficulties of broad spectra's in quantitative or qualitative investigations.

One of the advanced modern spectroscopy technique is Derivative Spectroscopy. Overlapped signals can be separated by derivatisation of Zero-Order spectrum. Elimination of background can be done by the DS due to presence of other compounds in a sample. Now a days to resolve various analytical problems this technique is very useful as additional tool. DS as compared with the classical method is the dependence of derivatisation result on the shape of zero-order spectra. Which is one of the additional tools of DS, this property allows eliminating the influence of the background and increases selectivity of determination.

In quantitative analysis of multi component mixtures derivative spectrophotometry technique is a powerful tool. When derivatised, the maxima and minima of the original function take zero values and the inflections are converted in to maxima or minima respectively. Compared to original spectra derivative curves are more structured, enabling very little difference to the original spectras to be identified.

Derivative Spectrophotometry method has been widely used for differentiating, identifying weak peaks invisible by sharp peaks and enhances the

signal and resolves the overlapped peak-signals. Based on the scientific literature the following trends in applications of DS can be distinguished. In environmental analysis DS has been used for the analysis of metal ions. To solve complicated analytical problems DS is very useful additional tool. Mathematical processing of spectra is very easy to use as modern spectrophotometers, are automated and their software's are equipped in derevatisation unit. By selecting suitable mathematical parameters, which give benefits in sensitivity, selectivity and in simplification of analytical procedures. DS has been used in pharmaceutical analysis for evaluation of main ingredient in the presence of other components. For a one determination without sample purification the number of procedures has been devoted based on derivative spectra. Derivative Spectrophotometry is used for simultaneous determination of more than two components.