CHAPTER 1
INTRODUCTION
In general toxic metal ions attack the active sites of enzymes. They inhibit the function of enzyme. Heavy metal ions such as lead(II), cadmium(II) and mercury(II), in particular act as effective enzyme inhibitors. Heavy metal ions have low ionic charge and are rich in 'd' electrons. These have greater affinity to bind with sulphur. So, the heavy metal ions strongly bind with sulphur containing aminoacids (methionone and cysteine) which are known to be vital parts of the enzymes.

Metalloenzymes contain metals in their structures. The action these enzymes is inhibited in the presence of heavy metal ions. This is due to the replacement of active metal ion (for example, Zn$^{2+}$ in carboxy peptidase A) by heavy metal ions. This type of metal substitution leads to toxicity. The enzymes inhibited by cadmium(II) are adenosine triphosphotase, carbonic anhydrase, liver alcohol dehydrogenase etc. Similarly Pb(II) inhibits certain enzymes viz. alkaline phosphotase, cytochrome oxidase and some key enzymes in the synthesis of heme.
During the last two decades, there has been growing interest in the chemistry of sulphur containing ligands. Thiosemicarbazones are considered as one of the important classes of sulphur containing ligands. Thiosemicarbazones have been used for the spectrophotometric determination of several transition metal ions.

During the course of investigation on the use of sulphur and nitrogen containing organic ligands as analytical reagents, it is found that dithiosemicarbazones have good analytical properties. In the enolic form thiosemicarbazones contain -SH groups which bind strongly with heavy metal ions to give stable complexes.

Dithiosemicarbazone, viz. 1,3-cyclohexanediol bisthiosemicarbazone monohydrochloride (1,3-CHDT, HCl) has been extensively used as chromogenic reagent for the spectrophotometric determination of several transition metal ions. In order to improve the analytical potentialities of 1,3-CHDT, HCl it is considered worthwhile to incorporate two methyl groups on the 5th C-atom of cyclohexane ring. For this reason, 5,5-dimethyl-1,3-cyclohexanedione bisthiosemicarbazone monohydrochloride has been synthesized and characterized. The analytical properties of the ligand are explored.
The complex formation reaction between the heavy metal ions and thiosemicarbazones has been infrequently utilised for the determination of metal ions. In addition, the oxidation reaction of thiosemicarbazones are rarely used for the determination of metal ions. Hence, the present study deals with spectrophotometric determination of Cr(VI), Pb(II) and Cd(II) using 5,5-dimethyl-1,3-cyclohexanедione bisthiosemicarbazone monohydrochloride.