CHAPTER 1

INTRODUCTION

CHAPTER 1: INTRODUCTION

Schiff bases are compounds which contain the azomethine group (-C=N-). These compounds are synthesized by the reaction of a primary amine and an active carbonyl compound (aldehyde or ketone) [1].

The most characteristic respect in which compounds containing the C=N bond show basic properties in the formation of complexes is with metals.These complexes provide some very characteristic series of co-ordination compounds, and consequently alarge number of them have been prepared and their properties were examined and compared. The basic strength of the C=N group is insufficient by itself to permit for the formation of stable complexes by simple co-ordination of the lone pair to ametal ion.Therefore in order the stable compounds should be formed, it is necessary that there should also be molecule with a functional group with a replaceable hydrogen atom is present, 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 [2].

A great deal of information regarding the properties of synthetic Schiff bases of potential biological interest has arisen during the last few years ,several of these compounds were synthesized, characterized, and tested for various biological activities including anti-ulcer, anti-inflammatory ,anti-oxidants and others. Such activities may be related to the structural arrangements of the ligands, and to the nature of the substituent groups.

Different classes of organic compounds containing rich conjugated systems and hydroxyl groups were found to have potent anti-oxidant properties, among those Flavonoides and their chromium and copper complexes. However, those biological

activities can be altered depending upon the types of substituents attached to the aromatic ring.

Free radicals are considered to responsible for the oxidative damage to biomolecules such as carbohydrates, proteins, lipids and DNA, thus accelerating various types of diseases [3,4].

The current research is focused on the synthesis, characterisation and antioxidant activities of substituted 4-phenyl-1,3,5-triazine-2,6-diamine Schiff bases and the corresponding nickel(II), copper(II), and zinc(II) complexes. The Schiff bases were synthesized from the condensation reaction of 4-phenyl-1,3,5-triazine-2,6-diamine with 5-chlorosalicyladehyde, 5-bromosalicyladehyde, 5-nitrosalicyladehyde, 3-hydroxysalicyladehyde, 4-hydroxysalicyladehyde, and 3,5-di-*tert*-butylsalicyladehyde.

The structures of the Schiff bases and the metal complexes were elucidated by elemental analyses (CHN), Fourier transform infrared spectroscopy (FT-IR), and ultraviolet-visible spectroscopy (UV-vis). Additionaly, ^{1}H- and ^{13}C- nuclear magnetic resonance spectroscopy (NMR) were recorded for the Schiff bases, while thermogravimetric analysis (TGA) was recorded for the complexes.

The antioxidant activities of the Schiff bases and complexes were examined using 1,1-diphenylpicrylhydrazyl (DPPH) radical scavenging method and ferric reducing ability power (FRAP).

This thesis contains six chapters. **Chapter 2** discusses the literature review on Schiff bases and their metal complexes, as well as their antioxidant activities. This chapter also contains general theoretical and physical aspects of the methods used to characterize Schiff bases and complexes, namely elemental analyses, Fourier transform infrared spectroscopy, ^{1}H- and ^{13}C- NMR spectroscopies, UV-visible

spectroscopy, and TGA. **Chapter 3** presents the experimental methods to synthesize the ligands and their metal complexes, instrumental techniques to characterize them, and techniques to determine their antioxidant activities. **Chapter 4** presents the results and discussion on the synthesis and characterization of the Schiff bases and metal complexes. It also includes the thermal properties of the complexes. **Chapter 5** presents the results of the antioxidant activities of these materials, and **Chapter 6** presents the conclusions and suggestions for future work. A list of references and appendixes were included at the end of the thesis.