Chapter-VI
SUMMARY
AND
CONCLUSION
Analytical chemistry is the study of matter in order to reveal its composition, structure and extent. Because these are fundamental in just about every chemical inquiry, analytical chemistry is used to obtain information, insure safety and solve problems in many different chemical areas, and is essential in both theoretical and applied chemistry. Analytical chemistry is the art and science of determining what matter is and how much of it exists.

Qualitative approach that was focused on determining what elements and compounds were present and a quantitative approach that aimed to establish the precise amount of an element or compound in a given sample. These qualitative approaches to analytical chemistry can be applied to materials in a variety of fields, including the food and beverage industry, the pharmaceutical industry. Synthetic materials such as polymers and natural materials such as minerals and water samples. As the field grew, analytical chemistry also broadened to embrace applications of its techniques in forensics.

Of the hydrazone derivatives, p-hydroxybenzoic hydrazones are potential analytical reagents due to the capacity of their molecules to form insoluble complexes spectra when reacted with transition metal ions. Presence of hydroxyl group, ring rationing group at rare position is an additional feature for the chelating property. Therefore, p-hydroxy benzoic hydrazones serves as better separating reagents, even at sub microgram level.

In the light of the above and in continuation of ongoing research in this field the author has synthesized a new reagent to develop new spectrophotometric methods for the determination of transition metals. The reagent is 2,4-Dihydroxyacetyl4-hydroxybenzoic hydrazone has been synthesized and characterized based on analytical and spectral studies. The structure of this ligand is given below. This reagent has been employed in the determination of transition metal ions Co (II) and Ni (II).

Chapter I deal with the principles of derivative spectrophotometry and its application in the analysis of organic and inorganic materials. It also presents the importance of benzoic hydrazones as potential spectrophotometric reagents for the determination of metal ions. The objectives of the present investigations are also included.
Chapter II presents the experimental procedures, and the preparation of 2,4-Dihydroxyacetyl4-hydroxybenzoic hydrazone and its characterization, metal ion solutions, buffer solutions and the preparation of solvents used in the present studies. The salient features of the instruments used in the present work are also incorporated.

Chapter III gives the general experimental procedures employed to arrive at the optimal conditions for the determination of metal ions by zero order and derivative spectrophotometry. It also includes the procedures used in the preparation of sample solutions of industrial and agricultural materials.

Chapter IV incorporates the studies pertaining to the spectrophotometric determination of cobalt(II) using 2,4-Dihydroxyacetyl4-hydroxybenzoic hydrazone as complexing agent. The chapter is divided into four sections.

Section 1: Explains briefly the colour reactions of some metal ions with 2,4-Dihydroxyacetyl4-hydroxybenzoic hydrazone (2,4-DHAHB) in acidic and basic mediums.

Section 2: Deals with the colour reaction between Cobalt(II) and 2,4-DHAHB. Cobalt(II) forms an lightpink coloured water soluble complex at pH 9.0. The complex shows absorption maximum at 405 nm. Various parameters such as effect of pH, reagent concentration and interference of associated foreign ions on the colour formation of cobalt (II) – 2,4-DHAHB complex are studied. Beer’s law is obeyed in the range of 0.2950-2.59 μg/ml. The composition of the complex is determined by Job’s method and molar ratio method. The mole ratio plot confirms the composition as 1:1 [Co(II):2,4-DHAHB]. The method is applied for the determination of cobalt(II) in steel and alloy samples.

Section 3: Deals with the first derivative spectrophotometric determination of cobalt (II) with 2,4-DHAHB. The study shows that the derivative amplitude is maximum at 445 nm in pH 9.0. The effect of foreign ions on the derivative amplitude is studied. The method is applied for the analysis of Co(II) in alloy steel samples.
Section 4: Deals with the second derivative spectrophotometric determination of cobalt (II) with 2,4-DHAHB. The study shows that the derivative amplitude is maximum at 415 nm and 460 nm at pH 9.0. The effect of foreign ions on the derivative amplitudes are studied. The method is applied for the analysis of Co(II) in alloy steel samples.

Chapter V: incorporates the studies pertaining to the spectrophotometric determination of nickel(II) using 2,4-Dihydroxyacetyl-4-hydroxybenzolic hydrazone as complexing agent. The chapter is divided into three sections.

Section 1: Presents the results of the spectrophotometric study carried out on the colour reaction between Ni(II) and 2,4-DHAHB. Ni(II) forms a lightbrown coloured water soluble complex with 2,4-DHAHB at pH 10. The complex has absorption maximum at 390 nm. Beer’s law is obeyed in the range of 0.520-5.09 μg/ml. The composition of the complex is determined by Job’s method and molar ratio method. The mole ratio plot confirms the composition as 1:1 [Ni(II):2,4-DHAHB]. The method established is applied for the determination of Ni(II) in alloys.

Section 2: Deals with the first derivative spectrophotometric determination of nickel (II) with 2,4-DHAHB. The study shows that the derivative amplitude is maximum at 425 nm in pH 10. The effect of foreign ions on the derivative amplitude is studied. The method is applied for the analysis of No(II) in alloy steel samples.

Section 3: Deals with the second derivative spectrophotometric determination of nickel (II) with 2,4-DHAHB. The study shows that the derivative amplitude is maximum at 455 nm and 495 nm at pH 10. The effect of foreign ions on the derivative amplitudes are studied. The method is applied for the analysis of Ni(II) in alloy steel samples.

Chapter VI: Summary and conclusion of the present study are given in this chapter.