SUMMARY

In the past few decades, a number of elegant instrumental techniques are reported which are rapid, selective and having a high degree of accuracy. Spectrophotometric methods of analysis is an excellent tool, which is widely used for the determination of wide variety of materials. The technique is the most commonly used method for metal analysis. Achievement of high accuracy and precision coupled with the cost effectiveness is the most important advantage of visual spectrophotometry. Therefore the availability of spectrophotometer made this technique indispensable to the modern analytical chemists.

Analytical chemistry plays a vital role in many research areas in chemistry, biochemistry, biology, geology, and other sciences and analytical chemist has a very important role in modern industrialized society. Thus most industries rely upon both qualitative and quantitative chemical analysis to ensure that the raw materials used meet certain specifications, and also to check the quality of the final product. Analysts have developed large number of instrumental techniques and these techniques are extremely sensitive and can yield results rapidly to a high degree of accuracy. Among these instrumental analytical techniques, spectrophotometric technique occupies a unique position because of its simplicity, sensitivity, accuracy and rapidity. The availability of spectrophotometer made this technique indispensable to the modern analytical chemists. It is the most important method for determining metals in alloys, minerals and complexes, owing to its sensitivity and selectivity. Spectrophotometry offers the advantage of having calibration graphs that are linear over a wide range. These instruments are with digital readouts or connected to a computer, which provides a high degree of accuracy and an excellent way to determine the metal ion in parts per million levels. The limitation to its use is set by the degrees of interference from other metal ions.

Absorption spectrophotometry in the ultra-violet and visible regions is considered to be one of the valued techniques for the quantitative analysis. The basis of spectrophotometric methods is the simple relationship between the color of a substance and its electronic structure. A molecule or an ion exhibits absorption in the visible or ultra-violet region when the radiation causes an electronic transition in
molecules containing one or more chromophoric groups. The colour of a molecule may be identified by substituents called auxochromic groups, which displace the absorption maxima towards longer wavelength (bathochromic shift). The colour determining factors in many molecules is the introduction of conjugated double bonds by means of electrons donor and electron acceptor groups. The importance of the coloured solution lies in the fact that the radiation absorbed is characteristic of the material responsible for absorption. Any soluble coloured material can be determined quantitatively as well as qualitatively. In addition, a substance that is not coloured may often be determined by adding a chromogenic reagent that will convert to an intensively coloured species showing strong absorbance in the visible region. This absorbance data can be used for the determination of metal ions and anions in the suitable concentration range in accordance with Beer’s law. Proper selectivity can be achieved by controlling the pH, using masking agents etc. It provides an excellent way to determine the metal ions and anions in parts per million.

Cephalosporins are penicillinase-resistant antibiotics with significant activity against both gram-positive and gram-negative bacteria. The key intermediate for semisynthetic production of a large number of cephalosporins is 7-aminocephalosporanic acid, which is formed by hydrolysis of cephalosporin C produced by fermentation. A few thousand semisynthetic cephalosporins have been described in the scientific literature, but only a small number of these has shown clinical importance. One of the current objectives of research on new semisynthetic cephalosporins is the preparation of compounds with β-lactamase resistance plus acid stability, in order to make possible effective absorption from the gastro-intestinal tract.

Mosapride citrate, chemically 4-amino-5-chloro-2-ethoxy-N-[[4-[(4-fluoro-phenyl)methyl]-2-morpholinyl]-methyl benzamide citrate is a potent gastroprokinetic drug. Gastroprokinetic agents have an important role to play in conjunction with lifestyle modifications in the short and long term medical management of gastroesophageal reflux disease (GERD). The prevalence of GERD and dyspepsia is increasing in many Asian countries. It behaves as a selective 5-HT4 receptor agonist and enhances only upper gastroprokinetic motor activity. Now it is proposed to have
new analytical reagents for the spectrophotometric determination of cephalosporins and mosapride in pharmaceutical preparations.

The present investigation is the studies on new reagents for the spectrophotometric determination of anions, metal ions and drugs. The work included in the thesis is divided into 9 chapters

Chapter 1 provides an introduction to spectrophotometry.

Chapter 2 describes the spectrophotometric determination of iodate using methylene blue, rhodamine B and leuco xylene cyanol FF as chromogenic reagents. The effects of diverse ions are studied and the method is applied for the determination of the iodate in iodized table salt and sea water samples.

Chapter 3 deals with the spectrophotometric determination of hypochlorite using methylene blue and rhodamine B as chromogenic reagents. The interference of various cations and anions are studied and the method is applied for the determination of the hypochlorite in various samples of tap water, natural water and milk.

Chapter 4 describes three new reagent for the spectrophotometric determination of vanadium using toluidine blue, safranine O and leuco xylene cyanol FF as chromogenic reagents. The method has been applied for the determination of vanadium in steel, pharmaceutical, environmental and biological samples. The effect of diverse ions is also discussed.

Chapter 5 describes the spectrophotometric determination of chromium using toluidine blue and safranine O as reagents. The method has been applied for the determination of chromium in steel, pharmaceutical and environmental samples. The effect of foreign ions is presented.

Chapter 6 presents spectrophotometric determination of arsenic using toluidine blue and safranine O as chromogenic reagents. The interference of various cations and
anions are studied. The method has been applied for the determination of arsenic in various environmental and biological samples.

**Chapter 7** describes the spectrophotometric determination of selenium using toluidine blue and safranine O. The method has been applied for the determination of selenium in environmental, biological and pharmaceutical samples. The effect of various diverse ions is also discussed.

**Chapter 8** deals with the spectrophotometric determination of cephalosporins using variamine blue and thionin as the selective reagents. The developed method has been successfully applied to the cephalosporins in pharmaceutical samples.

**Chapter 9** presents spectrophotometric determination of mosapride by diazotization method using sodium nitrite and coupled with acetylacetone or ethyl acetoacetate. The developed method has been successfully applied to the determination of mosapride in pharmaceutical samples.