A reliable and specific assay is of great importance for characterization of disposition, tolerance and safety of a drug. Recent years have seen an upsurge of interest in the application of potentiometric sensors in the field of medicinal analysis. This provides fast, accurate, reproducible and selective determination of various species. Chemical sensors have changed the way we think about analytical chemistry and clinical testing procedures. The applications of potentiometric sensors are manifold. It has been especially useful in pharmaceutical analysis.

As part of the present investigations eighteen sensors have been fabricated for the drugs mebendazole, pefloxacin, ambroxol, sildenafil citrate, dextromethorphan and tetracycline.

The thesis is divided into nine chapters. A brief account of the different chapters is given below.

**Chapter 1** gives a detailed description about the electroanalytical techniques in use. It gives a brief description about the history of the development of the potentiometric sensors. Various types of potentiometric sensors are described in detail. The chapter also gives an account on the potentiometric sensors fabricated for different drugs.

**Chapter 2** discusses in detail the synthesis of each of the ion associations used in the fabrication of the different sensors. It also describes the general method of fabrication of the two types of sensors. The chapter also discusses the general procedure for the analysis of the pharmaceutical formulations and real samples employed in the studies.
Chapter 3 presents the fabrication of PVC membrane sensor for mebendazole (MBZ) based on the ion associations of the drug with molybdophosphoric acid (MPA), silicotungstic acid (STA) and phosphotungstic acid (PTA) as ionophores. The sensors exhibited stable, fast Nernstian response over a wide concentration range. The developed sensors have also been used for the determination of the drug in pharmaceutical preparations and also for the determination of the drug in urine samples.

Chapter 4 illustrates the fabrication and electrochemical response characteristics of the sensors of pefloxacin (PEF). The sensors are based on the ion association of the drug with the ion pairing reagents silicotungstic acid (STA) and molybdophosphoric acid (MPA). The sensor matrix composition was optimized and the response studied. The analytical applications of the developed sensors were also investigated.

Chapter 5 focusses on the fabrication of carbon paste electrodes for ambroxol (AMB) based on the ion association of the drug with molybdophosphoric acid (MPA) and phosphotungstic acid (PTA). The electrochemical response characteristics were studied in detail. The developed sensors were successfully applied for the determination of the drug in tablets and for its recovery from urine samples.

Chapter 6 deals with the study of the response characteristics of sensors developed for sildenafil citrate (SIL). Optimization of the response characteristics the sensors developed is dealt with in detail. The analytical applications of the developed sensors are also given in detail.

Chapter 7 is devoted to the detailed description about the sensors developed for dextromethorphan (DEX) based on the ion association of the drug with two ion-pairing reagents such as sodium tetraphenyl borate (NaTPB) and
phosphotungstic acid (PTA). The various response parameters of the developed sensors are discussed in detail.

Chapter 8 presents a detailed account of the two types of sensors developed for tetracycline (TCE). The ion association of the drug with sodium tetraphenyl borate (NaTPB) has been employed for the fabrication of both the PVC membrane sensor and carbon paste electrode. The electrochemical response characteristics are given in detail. The developed sensors were applied for the determination of the drug in pharmaceutical formulations and also for the determination of the drug in urine samples.

Chapter 9 gives the summary and the conclusions of the work carried out.

References are given under separate head as the last part of the thesis.