CHAPTER 8
CONCLUSIONS
The antibiotics are used for the treatment of various diseases. Analysis of these drugs have become essential in recent years. Several methods reported in the literature for the determination of antibiotics are expensive, time consuming and are not useful for the routine analysis. UV – Visible spectrophotometry is still considered to be a convenient and low cost method for the determination antibiotics in pharmaceutical formulations. The author of this thesis has developed new, rapid and selective methods for the determination of tetracyclines, cephalosporins, and few other drugs.

The author developed simple and convenient spectrophotometric methods for medicinally important compounds namely paracetamol, ascorbic acid, aspirin and pencillin. Paracetamol on treatment with vanadium (V) or ferricyanide or sodiumnitrite produces characteristic colours which show maxima at 760nm, 475 nm and 420 nm respectively. The ranges of determination of paracetamol are 9-90 µg/ml, 3-21 µg/ml and 18-180 µg/ml respectively.

The author has developed six simple coloured reactions for the determination of ascorbic acid. It is reacts with vanadium(V), molybdophosphoric acid to produce characteristic colour with \( \lambda_{\text{max}} \) at 760 nm and 360 nm respectively. The acid to be determined in the following ranges 0.35 - 2.46 µg/ml and 0.17 – 0.88 µg/ml. Ascorbic acid can also be determined indirectly with potassium permanganate, Fe(III) – SCN in the ranges 7.76 - 28.16 µg/ml, 35.2 – 246.0 µg/ml and 7.76 – 28.16 µg/ml respectively.

Aspirin can be determined based on colour reaction with molybdenum (VI) with \( \lambda_{\text{max}} \) at 310 nm, 350 nm to produce characteristic colour. The determination is made in
the ranges 7.2 - 43.2 μg/ml and 7.2 - 57.6 μg/ml respectively. When aspirin is treated with nitration mixture, yellow nitrated product is obtained. The reaction can be exploited for the determination of aspirin down to microgram level (1.44 – 11.5 μg/ml) at 330 nm.

When pencillin is treated with chromium (IV) in presence of paracetamol is produces characteristic coloured reaction which shows absorbance maxima at 585 nm. This method is successfully employed for the determination of pencillin in the range 14.8 – 119.0 μg/ml.

The author developed simple and selective methods for the determination of tetracyclines based on its colour reactions. Determination of minicycline based on its colour reaction with molybdenum (VI), uranium (VI), vanadium (V) and vanadium (IV), are developed. The solution of pH 6 was suitable in the case of molybdenum, uranium and vanadium. The λ_max values are in the visible region. The drug can be determined accurately in the milligram range and all the metals can be determined in the microgram range employing these methods.

Methods for the determination of demeclocyline are also developed. These are also based on colour reaction between the drug and various metal ions molybdenum (VI), zirconium (IV), vanadium (IV), cerium (IV). Effect of various parameters on the absorbance indicated that the metals can be determined in microgram quantities while the drug can be determined in milligram quantities.

Spectrophotometric methods for the determination of minocycline based on its colour reaction with molybdenum (VI), uranium (VI), cerium (IV), and palladium (II) are developed. All these methods are applied for the determination of the tetracyclines in pharmaceutical formulations and the results are satisfactory.
The author has developed new, selective and convenient methods for the determination of cephalosporins. Studies on cadmium – cefotaxime (CTS) system reveals the cadmium forms a 1:1 complex with stability constant $6.7 \times 10^6$. Using this reaction cadmium can be determined 1.12 to 6.74 µg/ml and CTS in the range 0.02 to 0.12 µg/ml. Copper also forms a stable 1:1 complex with CTS in acidic medium. This reaction can be used for the determination of metal ion in the range 3.812 to 8.895 µg/ml and the drug in the range 0.02 to 0.12 mg/ml.

Investigation of cadmium – cefuroxime (CFS) system reveals that cadmium forms a 1:1 complex. The author is of the opinion that cadmium forms complex with CFS even at room temperature. The stability constant of the complex is $4.6 \times 10^6$.

The development of colour reaction between copper and CPN is quite faster than the other systems. It does not require heating and hence, this simple and direct method can be used for the determination of both metal ion and drug in the range 0.635 to 3.81 µg/ml, 0.02 to 0.12 µg/ml respectively. It is a 1:2 complex with stability constant $13.6 \times 10^{11}$.

A 1:2 Complex is formed between vanadium and CPN. This reaction can be used to determine vanadium in trace quantities in the range 0.51 to 4.07 µg/ml and CPN in the range 3.2 to 22.4 µg/ml.

Cadmium also forms a stable 1:1 complex with ceftriaxone (COS). Cadmium forms stable complex with COS even at room temperature. The stability constant is $6.2 \times 10^6$. 