Summary

Chapter 1

Contains the introduction which includes two parts: the first part gives an idea about an active inhibitor of the angiotensin converting enzyme (ACE), which has been widely used for the treatment of hypertensive diseases. A detailed discussion about the definitions, action and indications, metabolism and pharmacokinetics, chemical structures and chemical names, characters of the studied drugs (captopril, amlodipine besylate, diltiazem HCl, atenolol, lisinopril dihydrate and enalapril maleate) are given. The second part gives a literature survey of the previous studies for the analysis of the studied drugs including spectrophotometric, spectrofluorimetric, titrimetric, physicochemical, electro-analytical and chromatographic methods.

Chapter II

Contains the experimental part which includes apparatus used for measurement and procedures for the preparation of drug and reagent solutions. It also contains the proposed spectrophotometric methods for determination of the studied drugs in pure and in dosage forms. Also, it contains pharmacopoeial and official methods for analysis of the studied drugs.

Chapter III

Contains the results and discussion which include six parts, each part includes spectrophotometric procedure for determination of each

drug using $KMnO_4$ as oxidant. The proposed methods are based on oxidation of the studied drug by $KMnO_4$ and determination of the unreacted $KMnO_4$ by measuring the decrease in absorbance of different dyes (methylene blue, acid blue 74, acid red 73, acid red 27 and acid orange 7). The experimental variables are investigated.

1. Effect of potassium permanganate concentration

2-Effect of sulphoric acid concentration.

3-Effect of time and temperature.

4-Effect of sequence of additions.

5-Effect of dye concentration.

Beer's law is obeyed in the concentration ranges (0.4-12.5, 0.3-10, 0.5-11, 0.4-8.3 and 0.5-9.3 μg ml^{-1}), (1.0-24, 0.9-22, 1.2-26, 0.9-12.8 and 1.0-14 μg ml^{-1}), (0.7-10, 0.6-7.5, 0.5-13, 0.4-6.4 and 0.4-6.3 μg ml^{-1}), (0.3-5.0, 0.2-4.4, 0.2-3.9, 0.1-3.6, and 0.3-6.0 μg ml^{-1}), (0.5-10, 0.3-7.0, 0.5-9.0, 0.4-6.1 and 0.4-7.2 μg ml^{-1}) and (0.8-15.2, 0.7-11, 0.7-12, 0.5-7.6 and 0.6-9.5 μg ml^{-1}) for CAP, ADB, DIL, ATL, LIS and ENM, using MB, AB, AR, AM and AO dyes, respectively. For more accurate results, Ringbom optimum concentration ranges are determined. The apparent molar absorptivity, Sandell sensitivity, detection and quantitation limits are calculated. The stoichiometric ratios [O]/[Dye] are established using the molar ratio method which found to be (1.0:0.4, 1.0:1.79, 1.0:0.7, 1.0:1.41 and 1.0:1.41), (1.0:0.4, 1.0:1.59, 1.0:0.7, 1.0:1.57 and 1.0:1.41), (1.0:0.28, 1.0:1.41, 1:1.0, 1.0:1.2 and 1.0:1.41), (1.0:0.28, 1.0:1.41, 1.0:1.1, 1.0:1.49 and 1.0:1.59), (1.0:0.3, 1.0:1.59, 1.0:0.8, 1.0:1.2 and 1.0:1.2) and (1.0:0.3, 1.0:1.59, 1.0:1.0, 1.0:1.2 and 1.0:1.59) for CAP, ADB, DIL, ATL, LIS and ENM to $KMnO_4$ using MB, AB, AR, AM and AO, respectively.

The stoichiometric ratios of the studied drugs with $KMnO_4$ are established using the molar ratio method which found to be (1.0:0.8, 1.0:1.0, 1.0:0.9, 1.0:1.2 and 1.0:1.1), (1.0:0.56, 1.0:1.0, 1.0:0.56, 1.0:2.27 and 1.0:1.43), (1.0:1.11, 1.0:2.38, 1:2.0, 1.0:2.5 and 1.0:3.33), (1.0:2.56, 1.0:0.56, 1.0:2.5, 1.0:3.03 and 1.0:2.27), (1.0:1.54, 1.0:2.27, 1.0:2.23, 1.0:3.13 and 1.0:2.44) and (1.0:1.67, 1.0:1.67, 1.0:1.3, 1.0:2.7 and 1.0:2.13) for CAP, ADB, DIL, ATL, LIS and ENM to $KMnO_4$ using MB, AB, AR, AM and AO, respectively. In order to determine the accuracy and precision of the proposed methods, solutions containing three different concentrations of the studied drugs are prepared and analyzed in six replicates. The recovery, the relative standard deviation, the relative error and the confidence limits are calculated. The proposed methods are successfully applied to determine the studied drugs in the pure and in their dosage forms. The results obtained are compared statistically by Student's t-test (for accuracy) and variance ratio F-test (for precision) with the official methods at 95% confidence level. The results showed that the t- and F- values are less than the critical tabulated value indicating that there is no significant difference between the proposed and official methods. Thus the proposed spectrophotometric methods can applied in routine analysis for determination of the studied drugs in pure and in dosage forms. The results obtained from potentiometric indicated that pK (2.5, 4.1, 6.67 and 10.11), (3.0 and 5.34), (3.63), (4.1) and (9.55) for LIS, ENM, CAP, ADB and ATL, respectively. The free energy changes ΔG were calculated for these drugs, LIS (19.02, 31.19, 50.75 and 76.92), ENM (22.82 and 40.63), CAP (27.61), ADB (31.19) and ATL (72.66) k J mol^{-1}.