

CHAPTER I

INTRODUCTION

Introduction



Numerous antibiotic drugs have been used for the treatment of the common infectious diseases. These antibiotic families are β -lactams, tetracyclines, sulfonamides, quinolones, macrolides, aminoglycosides, and aminocyclitols. Tetracyclines is the one of the important families of the broad-spectrum antibiotics. These compounds have been employed extensively as bacteriostatic and antibiotic drugs. The members of tetracyclines are tetracycline, chlortetracycline, doxycycline, oxytetracycline, methacycline, minocycline, demeclocycline, and rolitetracycline. The selected tetracyclines used in this study are tetracycline, chlortetracycline, and doxycycline. They are used for treatments of many infections such as respiratory tract infection, typhus fever, rickettsial pox, urethritis, leptospirosis, pneumonia, amoebic hepatitis, and inflammatory acne. The microbiological assays are the official method for the determination of these compounds. These assays are complicated, time consuming, and non-specific. In order to avoid these problems, various techniques have been developed. High performance liquid chromatography (HPLC) with spectrophotometric [1], fluorimetric [2], and chemiluminometric [3] detections have been suggested. However, these detection methods normally require special instruments, reagents, pre- or post-column derivatization procedure, and experience. The alternative methods, which can be cheap, fast, and sensitive, are the

electrochemical methods. Voltammetry, amperometry, and polarography [4-6] have been used for this detection. The major drawback of polarography is the toxicity of mercury electrode. The deposition of detection products and/or solution impurities on the electrode surface is the disadvantage of voltammetry and amperometry. Pulsed amperometric detection (PAD) at noble metal electrode offers the possibility to clean and reactivate the electrode surface after each measuring cycle without the need for mechanical polishing [7]. Thus, PAD has been introduced to overcome these problems. Furthermore, flow injection analysis providing fast, repetitive, and reproducible analysis has been combined with PAD to reduce time consuming and obtain good results for the tetracyclines determination.

Objective and scopes of the research

The main objective of this research is to develop the electrochemical method and then apply the proposed method to investigate the determination of some antibiotic drugs using pulsed amperometric detection at gold disk electrode applied to flow injection system. This study was divided into three parts. The investigation of the electrochemical properties of the analytes at gold rotating disk electrode by rotating disk voltammetry was the first part of this research. Secondly, the optimal waveform parameters for pulsed amperometric detection were performed at the gold disk electrode with a flow injection system. Finally, the analytical performance including linear range, detection limit, repeatability, and sensitivity of this proposed method were also examined. Moreover, flow injection with pulsed amperometric detection

using gold disk electrode was applied to the determination of the drug capsules in the last part.