CHAPTER I

INTRODUCTION

Rational for the Study

An alcoholic beverage is a drinkable liquid containing ethanol, the second main component after water, and commonly known as alcohol. Alcoholic beverages are divided into three general classes including beers, wines and distilled spirits (also called "distilled liquors" or "spirits"). Popular distilled spirits are such as brandy, whisky, rum, vodka and gin. Beers and wines are produced by fermentation of sugar/starch from plant materials. Distilled spirits are also made from fermentation of sugar/starch and followed by distillation to increase ethanol content. Therefore, distilled spirits normally have higher ethanol content than beers and wines [1, 2, 3, 4, 5, 6]. For ethanol value, it is approximately in the ranges of 4-16 %ABV for beers and wines and 30-60 %ABV for distilled spirits [7, 8].

Measurement of ethanol percentages is a key analytical parameter in the alcoholic beverage industry. Consequently, several analytical methods have been used for quantifying ethanol content of alcoholic beverage in order to control quality, conservation and tax collection of the product. These methods include conventional titration [9, 10], spectrophotometry [11, 12, 13], gas chromatography [14, 15, 16, 17, 18], high performance liquid chromatography [19, 20], voltammetry [21] and infrared spectroscopy [22, 23]. According to review papers, some of these methods are not automated technique, high cost of instrumentation and high chemical consumption. To compromise for these reasons, continuous-flow methods such as flow injection (FI) analysis [24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37] and sequential injection (SI) analysis [38, 40, 41] were required to determine ethanol content. Hydrodynamic sequential injection (HSI) analysis [42, 43, 44, 45], additional generation of flow injection techniques, is also interested for the proposed reason.

In this work, the homemade FI-colorimetric and HSI-spectrophotometric systems were designed, constructed and developed for the determination of ethanol in alcoholic beverage. These systems gained simple, automation or semi-automation,

cost-effective instrument, low chemical and sample consumption, precision and accuracy.

Objectives of the Study

1. To develop a homemade FI-colorimetric system for the determination of ethanol in Thai white distilled liquor.
2. To develop a homemade HSI-spectrophotometric system for the determination of ethanol in alcoholic beverage.

Scopes of the Study

Ethanol content in alcoholic beverages such as wines, beers and/or distilled spirits (e.g. whisky, white distilled liquor and brandy) will be determined by design, construction and development of the homemade FI-colorimetric and HSI-spectrophotometric systems. The proposed procedures offered several advantages, i.e. simple, automation or semi-automation, cost-effective instrument, low chemical and sample consumption and acceptable precision and accuracy.

Expected Benefits

1. Achieve the FI-colorimetric and HSI-spectrophotometric systems for the determination of ethanol in alcoholic beverage.
2. Present the results in the national and/or international academic conference by poster and/or oral presentation or published the academic paper.