CHAPTER 1

INTRODUCTION

1.1 Background of Study

Ultrasonic extraction is a new technology for extraction of plant material that can be carried out at lower temperatures, avoiding thermal damage to extracts and loss of volatile components in boiling.

The improvement of solvent extraction from plant material by ultrasound is due mainly to the mechanical effects of acoustic cavitations, which enhances both solvent penetration into the plant material and the intracellular product release by disrupting the cell walls.

The extraction of organic compounds from various plant materials can be significantly improved with the aid of intense ultrasound, achieving higher product yields at reduced processing time and solvent consumption.

More recently, application of ultrasonic technology in food processing attracted widely attentions Comparative investigation of the influence of classical and ultrasonic techniques on the yield and the structural features of extracts from wheat straw and the root of valerian have shown a higher yield and stability of functional properties of lignin and water-soluble polysaccharides using the latter method (Sun et al., 2002). Ultrasonic extraction carnosic acid from *Rosmarinus officinalis* using ethanol was effective in producing a greater yield and shortening of extraction time (Albu and Mason, 2004).
Sun and Tomkinson reported a procedure for ultrasonic extraction of hemicelluloses from wheat straw,

Romdhane and Gourdou isolated pyrethrines from pyrethrum flowers and oil from woad seeds using ultrasound. The optimization of ultrasound variables according to a specific plant matrix is also of importance for achieving high extraction yield.

1.2 Problem Statement

Citrus fruit holds a unique place in plant kingdom and occupies a resulting solitary position in the human diet and playing an important role in food processing. Citrus peels represent a potential material for pharmaceutical and food industry since they contain significant flavonoids that are bioactive compounds with health-related properties. They have several hydroxyls in different position of rings, where there is strong chemical activity. Such components as antioxidants in various biological systems can display anti-allergic and anti-inflammatory activity.

The common commercial methods to produce the oils from lemon oil are mostly based on the correct choice of solvents and the use of heat and agitation to increase the solubility of materials and the rate of mass transfer. Essential oils derived from steam distillation of lemon fruits and also from various other method are widely in use as ointments, bathing oils or inhaling drugs for curing a wide range of skin and muscle-disorders of infectious, rheumatic or neuralgic origin. Those oils comprise various amounts of monoterpenes such as pinene, camphene, limonene, neral and myrcene as major components.

Usually, the traditional techniques require long extraction hours and have low efficiency. Moreover, many natural products are thermally unstable and may degrade during thermal extraction.
These earlier works have proved that ultrasonic extraction is a potential technology in food processing and pharmaceutical industry. Ultrasonic technique for lemon oil extraction is seems to be an attractive process.

In this work, the influence of solvents and time on the extraction rate of lemon peel (Citrus limon) via USE is studied.

1.3 Research Objective

The research objective is to study the effect of solvent and time in extraction of lemon peel oil from Citrus limon via Ultrasound extraction (USE).

1.4 Scope of Research

There are several scopes on this research which is:

(i) To study the effect of sonication time of extraction on the yields of lemon oil via ultrasonic extraction

(ii) To study the effect of low boiling point solvent (n-hexane, dichloromethane and diethyl ether) on yield of oil

(iii) To analyze the constituents in lemon oil by using GC-MS.

(iv) To determine the quality of oil produced by comparing the percent area of limonene peak in chromatogram