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EFFECT OF SONICATION AS PRETREATMENT ON THE BIOACTIVE COMPOUNDS IN HYDROSOL AND CONDENSATE FROM THE EXTRACTION OF AGARWOOD BARK

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ABSTRACT

The purpose of this study was to identify the effect of ultrasound as pretreatment on the bioactive compounds of Agarwood bark's hydrosol and condensate. Most of the researches conducted on this plant only focused on the yield of essential oil of Agarwood, where the condensate and the hydrosol or plant water from the experiments were considered as wastes. However, the yield of essential oil obtained is little when compared to the total amount of Agarwood bark used for the extraction. To overcome this problem, a research is made on the hydrosol of Agarwood which was often disposed and discarded. This is to prove that the so-called waste is also as beneficial as the essential oils. The compounds in the hydrosol were identified to determine the benefits or uses for each compound. To enhance the transfer of compound from the wood to the solvent, a pretreatment was conducted on the wood. Ultrasound water bath equipment was used as pretreatment process while for extraction, hydro-distillation was selected. Pretreatment of grinded Agarwood with ultrasonic was done by adjusting the frequency between 12 kHz (Degas), 23 kHz (Pulse) and 46 kHz (Sweep), where ultrasonic for each frequency was done for 45 minutes, 60 minutes and 75 minutes. Hydro-distillation was performed after the pretreatment process. The effect of frequency from sonication towards the time taken to collect 200 ml of hydrosol was observed and the compounds from condensate and hydrosol were identified using Gas Chromatography Mass Spectrometry (GC-MS). The arsenic level for each hydrosol was also identified for its heavy metal using Induced Coupled Plasma- Mass Spectrometry (ICP-MS). The results indicated that the main compounds in the hydrosol and condensate are fatty acid and aromatic compounds. The mole percentage of each compound was also observed and evaluated. From the results and evaluation that has been done, it can be concluded that hydrosol and condensate contain beneficial bioactive compounds and can be used as by-product.

Keyword: Agarwood, hydrosol, hydro-distillation, ultrasonic, GC-MS

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CHAPTER ONE
INTRODUCTION

1.1 RESEARCH BACKGROUND

Essential oils are known for thousands years for its aromatherapy and medicinal properties. Even from the ancient Chinese, Egyptians and Greeks era, essential oils are in high demand for restoration of health (Yangyang *et al*., 2013). Even in 10th century, the Arabians seek essential oil and used it to make medicine. Apart from being used as medicine, essential oils are widely used to make perfume. Several plants are known for its essential such as Jasmine, Agarwood, Tuberose, Cedarwoods, basils, peppermint. Plants like jasmine, citrus oil, basil and peppermint could be used for treating depression, geranium, lavender and bergarmot known for fear and anxiety treatment, rose, peppermint and carnation for improving concentration and eliminating lethargy. Essential oil can be obtained by several methods of extraction such as distillation (hydro-distillation or steam distillation), enflourage; mainly for delicate petals like jasmine and tuberose, Soxhlet method, accelerated solvent extraction and many more. Extraction is done directly from the bark, flower, fruit leaf, seed or root of a plant or tree.

The advantage of essential oils are for aromatherapy, used for treating depression, treating lethargic, treating anxiety and fear, reduce cellulite and wrinkles, improve digestion and also to balance the hormones. One of the disadvantages of essential oils is that they are very limited. To make a small amount of essence usually takes up hundred pounds of plant parts. Another one is some of essential oils could be very expensive because it can be limited. Common physical properties of essential oils including are able to be absorbed by the human body, non-greasy, partially water soluble and inflammable. Essential oils are soluble in both alcohol and carrier oil.

Extraction defined as the process of obtaining something from the mixture or compound by chemical or physical or mechanical means. Several methods are known to