UNIVERSITI TEKNOLOGI MARA

IDENTIFICATION OF HEALTH BENEFICIAL CHEMICAL CONSTITUENTS FROM THE HYDROSOL AND CONDENSATE OF *AQUILARIA MALACCENSIS* PRIOR SOAKING

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ABSTRACT

Agar wood (Aquilaria Malaccensis) is a fragrant wood containing economically important essential oil. It has been traded for many purposes including for incense, perfume and traditional medicine. However, the byproduct after hydro distillation which known as distillate (hydrosol) and condensate are, considered as waste. Therefore, this research was aimed to identify the remaining beneficial compounds that present in the hydrosol and condensate after hydro distillation rather than to be disposed. Mostly researchers are focused on analyzing the chemical constituent in essential oil only rather than the hydrosol and condensate. These agar wood bulks are much expensive in market so more study is compulsory on analyzing the content of hydrosol and condensate as well as the essential oil. Before hydro distillation process is carried out towards the agar wood, soaking process were conducted as pretreatment by varies its pH condition from acidic to base (pH 3, 4, 7, 11 and 12) at 25 ^{o}C. The soaking duration was standardized and set for one week for all samples. 100 g of grinded agar wood was put in the round bottom flask to run hydro distillation process by using 800 ml of distilled water as solvent. The hydrosol and condensate sample were taken after nine hours run through hydro distillation. Thermogravimetric analysis (TGA) was conducted to evaluate organic loss in the chips after being hydrolyzed. The condensate and distillate samples were analyzed with Gas Chromatography Mass Spectroscopy (GC-MS) to detect the compounds present. The result showed that the most suitable soaking condition for agar wood is at pH 3 with acidic condition. Analyzing by using GC-MS had shown that the composition of compound present after hydro distillation process was differed from each condition of soaking water. The major compositions of agar wood present in hydrosol and condensate are Piperidine-1-methyl, cis-α-Terpinol, Citronellol, Arginine, Rhodinol, 4-Methoxyphenol and Mequinol.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Gaharu is a plant resin based which can be found in *Thymelaeaceae* tree family of *Gongystylis, Aetoxylon, Gyrinops, and Aquilaria* (Bayram *et al,* 2004). *Aquilaria* is well known by various names such as aloeswood, eaglewood, calambac, agar wood and oud (Atikah *et al,* 2015). These different names happened due to the language and philosophy of the country in which it is found. In Malaysia, “Karas” is the nickname of this species. These species can be found in the jungle of Kelantan, Perak, Pahang and Terengganu. There are five species of Aquilaria are recorded in Peninsular Malaysia; *A. malaccensis, A. microcarpa, A. hirta, A. rostrata and A. beccariana oud* (Atikah et al, 2015). The high demands for these products are reported in the region of South and East Asia and the Middle East (Asma *et al,* 2014). These species enable to produce resin which use as a parameter for grading the agar wood oil.

A. malaccensis contains compound of sesquiterpenes, sesquiterpene alcohols, oxygenated compounds, hydrocarbons and acids (Azah *et al,* 2013). Sesquiterpene compounds that present in the agar wood make this species have its own good fragrance (Penpun *et al,* 2009). This species has been commercialized in perfumery products, pharmaceutical purposes, religious ritual activities and aromatic fragrances (Bayram *et al,* 2004).Therefore, agar wood based products are highly valuable and required in market. Currently, the issue regarding agar wood turns a new trend to be discussed in media. New technology extractions have been used such as microwave, supercritical fluid extraction, accelerated solvent extraction and ultrasonic extraction (Bayram *et al,* 2004). The old method which is hydro distillation is still being applied by traders. However, the efficiency of hydro distillation is lower compare to the others and chemical constituents present are very difficult to analyze (Veronica *et al,* 2016). To the best of our knowledge, there are few studies on analyzing the content in hydrosol and condensate. Due to its unpleasant smell, the sample of hydrosol and condensate in agar wood extraction process commonly are drown out and no further analysis. The condensate sample is brownish in colour and has a strong odor while the hydrosol just a colourless sample. The latest research shows that the condensate is acidic in properties due to the compounds that secreted via the pore