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Atsiri Oil Production Of Tobacco Leaves by Water Distillation Method

By Ni Ketut Sari

Atsiri Oil Production Of Tobacco Leaves By Water Distillation Method

Ni Ketut Sari, Ketut Sumada, Hendrix Abdul Ajiz, Winda Yulniar Fajarriani

Abstract: Within Tobacco leaves at the bottom, upper and interrupted by leaves from tobacco trees, are poorly used, whereas their availability is very abundant and continuous. As matter of fact, tobacco leaves contain terpene and terpenoid substances that can be used as one of Atsiri oil production. Atsiri oil is a volatile vegetable oil at room temperature and has a distinctive aroma, consisting of four major groups that predominantly determine the essential oil properties of terpenoid, terpenes, straight-chain compounds, benzene derivatives, and other compounds. The production of Atsiri oils using a water distillation method, which is used to isolate Atsiri oils from tobacco leaves, the characteristic of this water distillation is through contacting the tobacco leaves to boiling water, followed by hydro-diffusion of hot water and Asitri oils through plant membranes. The tobacco leaves should be dried yet to reduce its moisture content, distilled water obtained by distillate in the form of a mixture of water with the Asitri oil component of tobacco characterized by the distinctive aroma of tobacco. while separating Asitri oil components from water, the distillation is added salt NaCl which aims to reduce the solubility of Atsiri oil, so that the Asitri oil component is more easily separated from water, this method is known as Cohobation. For the best yield response step, the optimum condition between the ratio of tobacco and water is 1:17 with the refining time for 8 hours.

Index Terms: Tobacco Leaves, Cohobation, Water Distillation, Asitri Oil.

I. INTRODUCTION

Tobacco belongs to the genus *Nicotiana L.* species *Nicotiana tabacum L.* as matter of fact, Utilization of tobacco cultivation results so far only for the leaves taken in the middle of which is used as raw materials in the manufacture of cigarettes. Increased interest and demand for cigarette use from year to year. The use of tobacco into raw materials other than cigarettes so far is still done in the scale of research alone, the resulting product such as pesticides, and basic ingredients in the manufacture of perfume (Nurnasari and Subiyakto, 2011). Atsiri oil belongs to a big group of vegetable oil of viscous liquids at room temperature, but volatile, giving a distinctive aroma. Essential oils are commonly found in plants with odor or aroma. Chemically, essential oils are composed of a complex mixture of various compounds. Certain compounds in essential oils usually produce a particular or distinctive aroma. Most essential oils are included in the terpene and terpenoids which are soluble in oil (Lipofil) (Nurnasari and Subiyakto, 2011). The method usually used in the processing of volatile oil is Distillation, in the essential oil industry known 3 kinds of distillation methods, namely: distillation with water (water distillation); distillation with water and steam distillation; steam distillation (Guenter 1947). The distillation process of Atsiri oil could be through the several tobacco types, among others, Madura tobacco, Temanggung tobacco, Bondowoso tobacco (known as Virginia tobacco), and Blitar tobacco (oriental tobacco).

The distillation process was conducted by steam distillation that lasts for about 4 hours, with very little Atsiri oil produced (Nurnasari and subiyakto, 2011). whereas, by the direct distillation of the material with boiling water for 9 hours, the amount of Atsiri oil result is increased (Effendi, 2014).



Figure-1. *Nicotiana tabacum L*

Tobacco belongs to a group of toxic plants in which this taxonomy structure contains family of Solanaceae and genus *Nicotiana*.

Family : Solanaceae
Subfamily : Nicotiana
Genus : Nicotiana
Subgenus : Tabacum
Sexy : Genuine
Species : tabacum

(Basuki, Suwarso, Herwati, and Yulaikah, 1991).

The *Nicotiana tabacum* in leaves of the tobacco plant has been examining by Tso and Stedman composed of a wide variety of organic and inorganic compounds. In addition to the general classification, leaves components can be described as volatile, semi-volatile and non-volatile (Coleman, W.M., 2000). However, the Substances that affect tobacco and smoke quality include Nitrogen Compound (Nicotine Protein), Carbohydrate Compound, Resin and Essential Oils, Organic Acid, Substance (Murdiyati, A.S., 2009).

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Table-1. Chemical substances of tobacco

Component	Composition (% w/w)
Total Nitrogen	2,20
Protein Nitrogen (Protein)	1,58
Nicotin	0,67
Nitrogen from α -amino acid	0,30
Water Dissolved Carbohydrate	25,9
Cellulose	12,3
Pectin	13,4
Polypentose	4,90
Atsiri Oil	0,13
The resin in the extract using benzene	7,42
The resin extract uses petroleum ether	6,20
Polyphenol	4,39
Volatile carbonyl (acetaldehyde)	0,26
Organic acid	9,12
Oxalite acid	2,18
Citric acid	1,27
Malic acid	4,57
Volatile acid	1,12
pH of extracted water	5,54
Ash	15,4

(Source: Podlejski & Olejniczac, 1983)

According to Sipahelut (2012) quoted from Ketaren (1987) Atsiri oil is one of the remaining metabolism in plants that formed due to the reaction between various chemical compounds with water. Asitri oil compounds contain a variety of different chemical components, but these components can be classified into four major groups that predominantly determines the nature of Atsiri oils, namely:

- Terpen, which is associated with isoprene isopentane.
- Straight-chain compound, does not contain chain chains
- Benzene derivatives
- Various other compounds. (Guenther, 1947).

Essentially all Atsiri oils contain a mixture chemical compounds those very complex. Such as hydrocarbons, alcohols, oxides, esters, aldehydes, and others. The chemical composition of the essential oil is very complex, but it usually does not exceed 300 compounds. Whereas the components could determine the aroma of Atsiri oils typically a high percentage component. Atsiri Oil Benefits:

- Aromatherapy and health
- Have Aroma Fragrance.
- Food Additives. (Elyana, 2014).

Some methods have been done to obtain Atsiri oil such as through extraction, distillation, and others. In terms of economic and yield, the most widely used method today is distillation. This distillation technique consists of 3 types, namely steam distillation, water distillation and steam-water distillation. Steam distillation can yield more rendement than using water distillation. However, steam distillation takes longer time. While the steam-water distillation is a combination of both, it has the advantage of both. (Hutama, 2014). The novelty of our study on the method of distilling water by adding NaCl salt to the distillation product to obtain maximum essential oil yield.

2. METHODOLOGY

The materials used in this research are:

- Tobacco leaves, as the material to be isolated components of essential oil.
- Water, as a carrier medium of essential oil components.
- NaCl, as an agent that plays a role in reducing the solubility of essential oil components

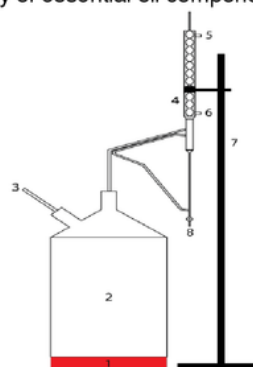


Figure-2. Water Distillation tool

Caption:

- Heater (Stove)
- Kettle (Distillation Vessel)
- Thermometer
- Upright Condenser
- Water Hose
- Water Relay Hose
- Station and Klem
- Defender

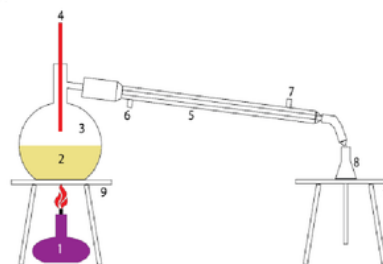


Figure-3. Kohobasi Toll

Caption:

- Bunsen
- Distillation Solution
- Pumpkin Distillation
- Thermometer
- Condensor Libik
- Cold water out
- Cold water comes in
- ErlenmeyerLegs Three

The assumptions used are 1 atmospheric operating pressure (1atm), operating temperature 100 OC. Variable used:

- Tobacco and water ratio (w / w): 1:11, 1:13, 1:15, 1:17, and 1:19.
- Operating time: 4, 5, 6, 7, and 8 hours.

In the process of distilling water, the tobacco and water are fed into the distillation boiler with a predetermined ratio. The distillation process is carried out at 1 atm pressure and with a

temperature of 100°C. The distillation process is carried out for a predetermined time. In the distillation process water will be obtained distillate in the form of main oil and distilled water containing dissolved oil component such as phenol. distilled water containing dissolved oil components will be refined (Cohobation) by saturating the distilled water with NaCl.

3. RESULTS AND DISCUSSION

Based on the Figure-4, stated the water ratio result to the yield of Atsiri oil, according to the revealed variables, the ratio of water with tobacco leaves, that are 1:11, 1:13, 1:15, 1:17, 1:19 and taking time up to 4 hours, 5 hours, 6 hours, the best water tobacco leaf ratio is 1:17. Where at 1:17 ratio is the most optimum point or condition revealing Atsiri oil rendement. the decline occurs because the more the amount of water in the process of distillation of the water the amount of alcohol and acid is also greater and the hydrolysis process will last until the next stage. This results in reduced yield of oil (Effendi, 2014)

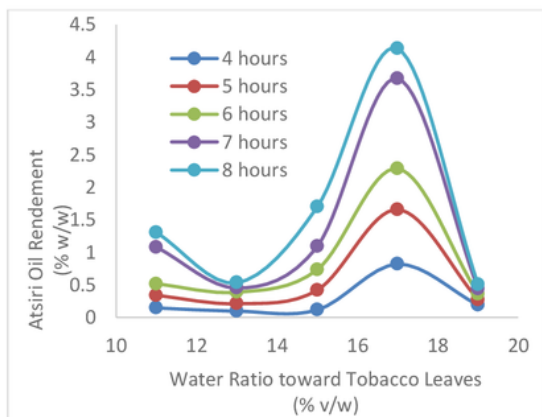


Figure-4. Water ration connection with tobacco leaves against Atsiri oil rendement (% w/w)

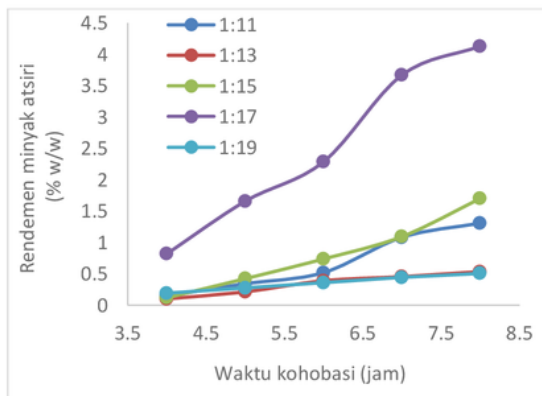


Figure-5. The connection between cohobation time (hours) and atsiri oil rendement (% w/w).

By the Figure-5 statement, we get the result of cohobation time to the essential oil yield, based on the graph it can be seen that the ratio of 1:17 with the time of 8 hours is the optimum condition that yields the maximum yield of essential

oil. The longer the cohobation chance of the material with the solvent to come in contact with the greater so that the extracted substance will also increase until the solution becomes saturated and its extract decreased, so that the addition of time will not give a significant increase of essential oil yield (Effendi, 2014).

4. CONCLUSIONS

By the overall finding, The longer the distillation time of the material with the solvent to get in contact with the greater, so that the extracted substance will also increase until the solution becomes saturated and the extract decreased since the addition of time will not give a noticeable increase in concentration. a decrease occurs also can occur because the more the amount of water in the distillation process the amount of alcohol and acid is also greater and the hydrolysis process will last until the next stage. This results in reduced oil yield. Based on This study "Production of Atsiri Oil of Tobacco with Water Distillation Method" finding, we propose for the process of distilling water to mixing the material with water and must be ensured all submerged, because the special feature of the distillation of water is contacting materials with boiling water, because in the process of distillation of water hydrodifusion events occur where water diffuses through membrane materials to bring essential oil components.

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