
Identification of Specific Gravity and Solubility in ethanol from citronella oil

Anwar Syahadat^{1*}, Ayus Diningsih²

^{1J} Faculty of Health, University Of Aufa Royhan in Padangsidempuan

^{2J} Faculty of Health, University Of Aufa Royhan in Padangsidempuan

Corresponding Author: Anwarsyahadat591@gmail.com

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ABSTRACT

Introduction: Essential oil is also known as ethereal oil or flying oil (ethereal oil, volatile oil) produced by plants. The oil is volatile at room temperature without decomposition, has a bitter taste, smells good according to the smell of the plant that produces it, is generally soluble in organic solvents and insoluble in water. At high concentrations, essential oils can be used as local anesthetics, for example clove oil is used to treat toothaches, but can damage mucous membranes. Most essential oils also have strong antibacterial and antifungal properties.

Methods: This research is a laboratory-based experimental study.

Results: Based on the specific gravity test, the tested lemongrass oil has good quality because it meets the requirements of the Indonesian National Standard, namely the specific gravity must be in the range of 0.880 - 0.922. From the tests carried out twice (duplo) the results obtained were in that range with the value in the first

Conclusion: The density of citronella oil is 0.8800 and the test sample meets the requirements of SNI. The solubility in ethanol of citronella oil is 1: 2 clear, the test sample meets the requirements of SNI.

INTRODUCTION

Essential oils (volatile oils or essential oils) are defined as complex mixtures that show and are compounds that evaporate with water vapor (1). This oil is also called volatile oil, etheric oil, or essential oil because at ordinary temperatures (room temperature) it easily evaporates in the open air (2). The term essential is used because essential oils represent the smell of the original plant (3).

Essential oils are also known as ethereal oils or flying oils (ethereal oil, volatile oil) produced by plants. The oil is volatile at room temperature without decomposition, has a bitter taste, smells good according to the smell of the producing plant, is generally soluble in organic solvents and insoluble in water (4).

At high concentrations, essential oils can be used as local anesthetics, for example clove oil is used to treat toothaches, but can damage mucous membranes. Most essential oils also have strong antibacterial and antifungal properties (5).

This oil is produced by plant cells or certain tissues of plants continuously so that it can give its own characteristics that differ from one plant to another. This oil is not a single compound, but is composed of a combination of various other "odor" compounds of different types, properties and properties (6).

Citronella oil or Citronella oil is an essential oil obtained from the leaves and stems of lemongrass (*Cymbopogon nardus*). The quality of essential oils in general and citronella oil in particular is determined by the purity factor. The quality of citronella oil is determined by the main components in it, namely the content of citronellal and geraniol which is usually expressed by the amount of geraniol content. Citronella oil must not contain or be contaminated by foreign materials such as fatty oils, alcohol, or kerosene (7).

Citronella oil is usually light yellow to dark yellow in color, is volatile. The value of specific gravity and solubility in ethanol from citronella oil are important in determining the quality of the oil which will have an impact on the production of the oil industry.

The purpose of this study was to determine the specific gravity of citronella oil and to determine the ethanol solubility of citronella oil. The formulation of the problem from this research is whether the citronella oil product complies with SNI.

METHODOLOGY

This research is an experimental laboratory based. The research was conducted at the Pharmacy Laboratory of Aufa Royhan University in Padangsidempuan. This research was conducted for 3 months in 2021. The tools used in this study were glassware, desiccator, water bath and polarimeter. The sample used in this study was citronella oil which was purchased from the Dawa Market Store, Padangsidempuan City. Ingredients used citronella oil, ethanol 70% aqueous solution of potassium hydroxide (KOH) 4% in water, anhydrous acetic acid, benzoyl chloride bromophenol blue soluble in ethanol, ice cubes, ethanol 80%, phenolphthalein (PP) 20%, hydroxylammonium chloride salt Soluble in ethanol, potassium Iodide, hydrochloric acid, sodium hydroxide, sodium carbonate, anhydrous sodium chloride and magnesium sulfate and anhydrous sodium acetate.

Determination of Specific Weight According to SNI 06-2387-2006

The procedure for determining the specific gravity of the oil is to wash and clean the pycnometer, then wash it with ethanol and diethyl ether, respectively. Dry the inside of the pycnometer with a stream of dry air and insert the lid. Leave the pycnometer in the weighing cabinet for 30 minutes and weigh (m). Fill the pycnometer with distilled water while avoiding air bubbles. Dip the pycnometer in a water bath at a temperature of $20^{\circ}\text{C} \pm 0.2^{\circ}\text{C}$ for 30 minutes. Insert the cover and dry the pycnometer. Leave the pycnometer in the weighing cabinet for 30 minutes, then weigh the contents (m₁). Empty the pycnometer, wash with ethanol and diethyl ether, then dry with a stream of dry air. Fill the pycnometer with an oil sample and avoid any air bubbles. Dip the pycnometer back into the water bath at a temperature of $20^{\circ}\text{C} \pm 0.2^{\circ}\text{C}$ for 30 minutes. Insert the lid and dry the pycnometer. Leave the pycnometer in the weighing cabinet for 30 minutes and weigh (m₂).

Determination of Ethanol Solubility According to SNI06-2387-2006

The procedure for determining the solubility in ethanol in oil is to place 1 ml of the oil sample and measure it carefully in a 10 ml measuring cup (8). Add 70% ethanol, drop by drop, shake after each addition until an oil-clear solution is obtained.

RESULTS

Based on the specific gravity test carried out, the tested lemongrass oil has good quality because it meets the requirements of the Indonesian National Standard, namely the specific gravity must be in the range of 0.880 - 0.922. From the tests carried out twice (duplo) the results obtained were in that range with the value in the first experiment 0.88 and the second experiment 0.88.

Table 1. Determination of Specific Gravity Data in Citronella Oil

No	M	m ₁	m ₂	Bobot Jenis
1	28,92 gr	38,61	37,34	0,88
2	38,35 gr	88,22	82,17	0,88
Average specific gravity				0,88

Information:

M : mass of empty pycnometer

M1: the mass of the pycnometer filled with water at 20⁰C (gr)

M2: the mass of the pycnometer containing the sample at 20⁰C (gr)

Results of Determination of Solubility in Ethanol

According to SNI 06-3953-1995 citronella oil, the requirements for solubility in ethanol of an oil are 1: 2 clear in ethanol 1: 2 clear in 80% ethanol for citronella oil, from the results of research on the test sample has a solubility value in ethanol that meets the requirements of SNI (9).

DISCUSSION

Solubility in ethanol is one of the physical properties related to the polarity and purity of essential oils (10). Essential oils that contain a lot of polar components will easily dissolve in polar solvents. The rest of the evaporation of nutmeg oil is a substance that should not be present in the essential oil. These materials are non-volatile components, usually in the form of fat or fixed oil or other materials that have a very high molecular weight. These materials are usually in the form of long-chain polymers formed by the polymerization process due to long storage or in the form of materials that are intentionally mixed in essential oils. Freshly distilled essential oil has not been stored for a long time and other ingredients have not been added, causing the remaining evaporation to be very small.

According to SNI 06-3953-1995 citronella oil, the requirements for solubility in ethanol of an oil are 1: 2 clear in ethanol 1: 2 clear in 80% ethanol for citronella oil, from the results of research on the test sample has a solubility value in ethanol that meets the requirements of SNI.

CONCLUSION

The conclusion of this resech is that the specific gravity of citronella oil is 0.8800 and the test sample meets the requirements of SNI. The solubility in ethanol of citronella oil is 1: 2 clear, the test sample meets the requirements of SNI.

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