Antioxidant Properties Of Liquid Smoke Cinnamon Production Of Variation Of Purification And Different Concentration

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Abstract: This study aims to determine the antioxidant properties of liquid smoke derived from a combination of purification and concentration of different liquid smoke. This study was conducted experimentally using factorial design in completely randomized 8 (eight) x 6 (six) treatment with 3 replications so that there are 144 experimental units. Treatment of purification include purification by distillation temperature of 100 ± 10 ° C; purification by distillation temperature of 140±10°C; purification using activated charcoal, purification using activated charcoal and zeolite mixture (50:50), purification by decantation for 1 day, 2 days and decantation decantation 3 days. Treatment includes the concentration of 1 ppm, 10 ppm, 100 ppm, 500 ppm, 1000 ppm and 1500 ppm. Variables observed consisted of the levels of antioxidants in the form of a percentage of inhibition (inhibition). The results showed a highly significant interaction (P <0.01) in the combination of purification with different concentrations of liquid smoke to the percentage of inhibition. The antioxidant activity of liquid smoke of 8 (eight) treatment purification and they are all strong because the IC 50 of 55.92 ppm. Liquid smoke antioxidant levels of 6 (six) different concentrations of liquid smoke are all relatively weak as a result of activity antioxsidant IC50 of 3589.7 ppm. In the combined treatment of 8 (eight) purification with liquid smoke concentration of 1500 ppm produced IC 50 of 43.12 ppm belonging to produce a potent antioxidant activity while the combination of other treatments less antioxidant activity. Based on these results it can be concluded that the antioxidant activity using different purification at a concentration of 1500 ppm liquid smoke is better used than other purification.

Key words: purification, liquid smoke, cinnamon, antioxidants.

1 INTRODUCTION

Advancement of Science later found out that a lot of factors that cause premature old process that is partly due to genetic factors, lifestyle, environment, gene mutations, immune system damage and free radicals. Of all the causes the free radical theory is a theory most often expressed [1]. Free radicals can come from pollution, dust and continuously produced as a consequence of normal metabolism [2]. Therefore we need a body of important substances and antioxidants that may help protect the body from free radical attack to reduce the negative impact ini. Antioxidant compound serves to overcome or neutralize free radicals that are expected with the administration of these antioxidants old process is inhibited or at least not "accelerated" and can prevent damage to the body of the onset of degenerative diseases [1]. The sources of antioxidants can be either synthetic or natural antioxidant antioxidants. But now the use of synthetic antioxidants began to be restricted because it turns out the results of research that has been done that synthetic antioxidants such as BHT (Butylated Hydroxy Toluene) turned out to be toxic to animal tests and carcinogenic.

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Therefore, the food industry and medicine switching develop natural antioxidants and find sources of new natural antioxidants [3]. There are many foods that can be a source of natural antioxidants, such as spices, tea, chocolate, foliage, Cereal grains, vegetables, enzymes and proteins. Most sources of natural antioxidants are plants and is generally a phenolic compound that is scattered around the plant either in wood, seeds, leaves, fruits, roots, flowers and pollen [4]. Compound phenolic or polyphenolic among others can be a flavonoid. The ability of flavonoids as antioxidants have been widely investigated during recent years, which flavonoids have the ability to change or reduce radical free and also as anti-free radical [5]. Liquid smoke is a solution of wood smoke dispersion in water, which is made by condensing the smoke of the incomplete combustion of wood. Liquid smoke contains many compounds that can be grouped into phenol, acids and carbonyl. The compounds are able to act as an antimicrobial, antioxidant, giving flavor and color formers [6][7]. Antioxidative components of the smoke are phenolic compounds that act as hydrogen donors and are usually effective in very small amounts to inhibit the oxidation reaction [8]. Liquid smoke can act as an antioxidant by preventing the oxidation of fat by stabilizing free radicals and effectively inhibited the formation of off flavors oxidative [7]. According [7], phenol is a major antioxidant in liquid smoke. Antioxidative role of liquid smoke is indicated by a high-boiling phenolic compounds, especially 2,6-dimetoksifenol; 2,6 dimethoxy-4-metilfenol and 2.6-dimethoxy-4-etilfeno1 [9], which acts as a hydrogen donor against free radicals and inhibiting the chain reaction [10] [8] [7]. The use of liquid smoke to the food product has several advantages than fogging traditional, including: saving cost required for timber and equipment manufacturing of smoke, can set the flavor of products as desired, can reduce component dangerous (compound benzo(a)pyrene is carcinogenic) , can be used has on the food which can not be solved by traditional methods, can be applied to the general public, reducing air pollution and the composition of the liquid smoke lebii consistent to use repetitive [11] [12][7]. The use of liquid smoke to the food products have been widely applied.

Application is done by adding in products such as sausages, immersion for pork products as well as sausage, injection as in pork products and atomization for habi meat products and sausages [7] All kinds of wood distillate containing compounds that can be extracted as a phenol derivative that can act as antioxidants. Liquid smoke from wood can be utilized as a preservative because of the similarity of chemical components contained in the distillate timber certain kinds of preservatives, where that act as preservatives is phenol and its derivatives. Efforts to provide added value from waste crops such as cinnamon plantation in West Sumatra province that had been taken by the new skin, while the wood used as firewood and therefore has not received optimal treatment. To increase the added value in addition to the wood produces a distinctive aroma it is necessary to do research on antioxidant activity. On the other hand the problem of liquid smoke still contains toxic hence the need for purification. Information on the antioxidant activity of various means of purification and concentration of liquid smoke has not been much different. Thus this study aims to determine the antioxidant activity of liquid smoke obtained from purification with different concentrations of liquid smoke.

2. RAW AND TOOLS

2.1. Materials Research

a) Raw materials: The raw material liquid smoke cinnamon at a temperature of 400oC pyrolysis, zeolites, activated charcoal.
b) Chemicals: The material used was DPPH, Folin.

2.2. Tools used for research

The tools used in used in this study such as scales, flask, cup petrialis, electric stove, filter paper, oven, incubator, distillation apparatus, analytical balance, oven, porcelain dish, desiccator, filter, thermometer, pH meter, Erlenmeyer 125 ml and 500 ml, beaker, filter paper, soxhlet, test tubes, centrifuge tubes, micro burette, pipette, pipette volumetric flask of 250 ml, centrifuge, UV-Vis spectrophotometer, vacuum pump.

3. THE METHOD

This research uses experimental completely randomized design (CRD) with 8 treatment purification was repeated three times to obtain 24 experimental units include (1) the purification by distillation yatu 100 ± 10 ° C, (2) purification by distillation temperature of 140 ± 10 ° C, (3) purification by filtration using active Charcoal (AA), (4) purification by filtration using activated charcoal (AA) and zeolite (Z) ratio of 50:50, (5) screening using a zeolite (Z), (6) purification by sedimentation/decantation during 1 day, (7) purification by precipitation for 2 days, (8) purification by precipitation 3 days. The data were analyzed by analysis of variance on the real level of 5%,significantly different when followed by Tukey's test at 5 percent significance level [13].

3.1. Implementation research

Liquid smoke purification is done on raw materials cinnamon with pyrolysis temperature of 400 ± 10 ° C for standard sign issued by [14] and the toxicity of benzo (e) pirennya lower than the second most other raw materials. Activity purification performed on liquid smoke cinnamon on pyrolysis 400^{o}C silenced once 1 week to precipitate Tar, after standing for 1 week followed by administration of the treatment purification by distillation at a temperature of 100±10°C and 140±10°C for 1 hour, filtering (absorption) using activated charcoal, activated charcoal mixture with zeolite (50:50) and zeolite and precipitation for 1,2 and 3 days.

a. Distillation

In the process of distillation: a sample of liquid smoke cinnamon result of pyrolysis at temperatures of 400^{o}C as much as 100 ml put in a distillation flask where the container where the distillation flask using oil as a good conductor of heat and kept heated using an electric heater. The distillation process is done when the temperature of the heating medium (oil) is already showing the desired temperature appropriate treatment that 100^{o}C and 140oC. Interest distillation to take all factions and is set at a temperature of 100^{o}C dan suhu 140^{o}C. At each temperature treatment made three replications. Temperatures shown are the temperature of liquid smoke in the distillation flask. The steam is formed and into the coolant pipe behind (condenser) and the distillate is collected in a flask. In this purification process is obtained quality liquid smoke II quality. The results of the results of purification of liquid smoke then analyzed the antioxidant properties of the form (%) inhibition.

b. Filtering (adsorption) using activated charcoal, mix AA + zeolite and zeolite

Liquid smoke cinnamon result of the pyrolysis temperature of 400 ° C as much as 100 ml of activated carbon mixed with as much as 3.5% [15] conducted using the next funnel was shaken and allowed to stand for 15 minutes. The same activities carried on zeolite materials and a mixture of both ready-made, after settling 15 minutes filtered through Whatman filter paper No. 42. The result of the purification was done subsequently repeated 3 times and analyzed the antioxidant properties of the form (%) inhibition.

c. Precipitation

Liquid smoke prepared cinnamon in a measuring cup of 100 ml each were then deposited / decantation for 1, 2 and 3 days is done with three replications. This treatment refers to the results of research [16] Furthermore, the analysis of the antioxidant properties of the form (%) inhibition.

3.2. Test Antioxidant activity, DPPH method [17] modified

a. Making solution

Preparation of DPPH 634 µg. The trick DPPH weigh as much as 0.0014 gram dissolved in 14 ml of methanol, the solution was shaken so homogeneous and then inserted into a dark bottle. The absorbance was measured using UV-Vis spectrophotometer T-70 to obtain the maximum wavelength.

b. Making control solution.

The trick in 1500 mL of methanol was added to 500 mL of DPPH solution, the solution was shaken until homogeneous.

c. Making test solution.

- Solution parent (10,000 ppm); how to take 100 ml of liquid smoke is the result of a combined treatment of raw materials with different temperature pyrolysis dissolved into 10 ml of methanol = 100 ml / 10 ml = 10 000 mL / ml = 10,000 ppm
- larutan series

a) 1 ppm; how to take 20 mL of methanol mother liquor was added to 1500 mL volume was then added 500 mL solution of DPPH
b) 10 ppm, its taking 200 mL of methanol mother liquor was added to 1500 mL volume was then added 500 mL solution of DPPH
c) 100 ppm, its taking 200 mL of methanol mother liquor was added to 1500 mL volume was then added 500 mL solution of DPPH
d) 500 ppm, the way he took in 1000 mL of methanol mother liquor was added to 1500 mL volume was then added 500 mL solution of DPPH
e) 1000 ppm, the way he took in 2000 mL of methanol mother liquor was added to 1500 mL volume was then added 500 mL solution of DPPH
f) 1500 ppm, the way he took in 2500 mL of methanol mother liquor was added to 1500 mL volume was then added 500 mL solution of DPPH

d. Absorbance measurement

All of the control solution, test solutions were shaken using a water bath shaker and incubated at 37 ° C for 30 minutes in the dark (closed aluminum foil). This is done because DPPH radical easily degraded by light. Then the absorbance was measured using a UV- Vis spectrophotometer at a wavelength of 515.8 nm. After an absorbance values obtained are calculated barrier (%) of each solution by using the formula [18][19][20]:

$$\% \text{ Barrier} = \frac{(\text{Abs control} - \text{Abs sample})}{\text{Abs control}} \times 100\%$$

Information:

Control Abs = absorbance of the sample does not contain

Abs sample = absorbance of the sample

Having obtained the percentage of obstacles in search activity IC 50 values through the linear regression equation y = a + bx

e. Data analysis antioxidants

Data antioxidants on DPPH radicals (% inhibition / inhibition) of liquid smoke from a combination of raw materials to the pyrolysis temperature and different concentrations were analyzed and calculated the value of the IC 50. The smaller the IC 50 value means stronger antioxidant activity. In this study were analyzed and IC50 values are calculated using a linear regression equation [18][20][21]. Data percentage obstacles, raw material, temperature pyrolysis and concentration of liquid smoke is used to find the value of IC 50 with the linear regression equation y = a + bx, where y is the % inhibition of 50 ($ 50) and x is the value of IC 50 [22][23]. Here is a chart of the antioxidant activity classification according to [24]:

Table 1.
Classification of antioxidant activity

No	IC 50	Value Of Antioxidants
1	<50 ppm	Very strong
2	50-100 ppm	Strong
3	100 -150 ppm	Medium
4	150 -200 ppm	Weak

4. RESULT AND DISCUSSION

Antioxidants Test (% inhibition)

a. Effect of purification of the antioxidant test (% inhibition) of liquid smoke cinnamon

Analysis of variance showed the combination treatment showed a concentration purification with the interaction of the antioxidant liquid smoke cinnamon (P <0.05). The interaction means between purification with a difference konsentrsi jointly affect antioxidant liquid smoke. The average activity of the antioxidant effect of treatment purification liquid smoke can be seen in Table 2 below.

Table 2.
Summary of average test antioxidants (% inhibition) of liquid smoke cinnamon in a manner different purification

How purification liquid smoke	% Inhibisi	IC_{50} (ppm)	The regression equation
1. distillation i 100 ±10°C	21.606 a		
2. distillation 140 ±10°C	17.622 bc	55.922	Y = 0.6373x + 14.361
3. Activated charcoal filtering (AA) : 3,5%	14.439 d		R^2 = 0.3365
4. Activated charcoal filtering (AA) + Zeolit (Z) comparison 50:50 as much as 3,5%	18.022 bc		
5. filtering Zeolit (Z) : 3,5%	19.561 ab		
6. The deposition for 1 day	21.033 a		
7. The deposition for 2 day	16.622 c		
8. The deposition for 3 day	17.922 bc		

*Description: * Different superscript letters in columns averaging showed significant difference (P <0.05)*

Based on Table 2 shows the percentage of the greatest inhibition found in treatment purification by distillation of 100 ± 10 ° C of 21.606% was significantly different from other treatments. The smallest percentage of inhibition contained at treatment of activated charcoal filtration (AA) of 14.439% is not significantly different from other treatments. The value of the percentage inhibition on the purification of liquid smoke cinnamon distillation temperature of 100 ± 10°C is suspected because there are many chemical components that can be outlined at the time of distillation so that the percentage of inhibition to be great. Figures intensity of concentration (IC_{50}) amounted to 55.922 ppm means to show antioxidant activity by 50% in need of liquid smoke as much as 55.922 ppm. By the standards of [23] states that the antioxidant activity of the eight (8) different ways as very powerful purification is by IC50 <50 ppm. Testing of antioxidant activity using DPPH (2,2-diphenyl-1-picrylhydrazyl). DPPH method is chosen because it is a method that is simple, easy, quick and sensitive and requires only a small sample to the evaluation of the antioxidant activity of the compounds of natural materials [18]. The principle of quantitatively measuring the antioxidant activity using DPPH method is the change in the intensity of the color purple DPPH is proportional to the concentration of the DPPH solution. DPPH free radicals that have unpaired electrons will give the color purple. The color will change to yellow when the electron pairs. Changes in the intensity of the purple color is due to the reduction of free radicals generated by DPPH molecules reacting with hydrogen atoms released by the sample molecule compounds to form compounds

Diphenylpikril hydrazine and cause decay DPPH color from purple to yellow. This color change will provide a change of absorbance at a wavelength of maximum DPPH using UV-Vis spectrophotometry so they will know the value of the activity of free radicals reduction expressed by IC50 value (inhibitory concentration) [18]. According [25] that the addition of antioxidants (AH) primer with low concentrations of the lipids can inhibit or prevent auto oxidation reaction of fats and oils. Such addition may block the oxidation reaction at the stage of initiation and propagation (reaction 1). Radicals, antioxidants (A *) formed in the reaction is relatively stable and does not have enough energy to be able to react with other lipid molecules and form a new lipid radicals.

Initiation: R * + AH ----------> RH + A *
Radikallipida
Propagation: ROO * + AH -------> ROOH + A *
Reaction 1. Inhibition of primary antioxidant against lipid radicals

Furthermore [25] states that the greater the concentration of the antioxidant is added may affect the rate of oxidation. At high concentrations, the antioxidant activity of phenolic groups often disappear even becomes prooxidant antioxidant (Reaction 2). The influence of the amount of concentration on the rate of oxidation depends on the structure of the antioxidant, conditions and sample to be tested.

AH + O2 ----------> A * + HOO *

AH + ROOH ---------> RO * + H2O + A *

Reaction 2. Antioxidants act as prooxidant at high concentrations

b. Effects concentration of the liquid smoke. Test antioxidants (% inhibition) of liquid smoke woodsweet

Analysis of variance showed the combination treatment showed a concentration purification with the interaction of the antioxidant liquid smoke cinnamon P <0.05). The interaction means between purification with a difference konsentrsi jointly affect antioxidant liquid smoke. The average activity of antioxidant effect of different concentrations of liquid smoke can be seen in table 3 below.

Table 3.

Activities Average (%) inhibition of liquid smoke cinnamon with different concentrations of liquid smoke.

The concentration of liquid smoke	(%) inhibisi	IC $_{50}$ (ppm)	The regression equation
1. 1 ppm	9.192 f		
2. 10 ppm	14.067 e		
3. 100 ppm	16.496 d	3589.709	Y = 0.0103x + 13.026
4. 500 ppm	19.575 c		R2 = 0.8911
5. 1000 ppm	22.371 b		
6. 1500 ppm	28.421 a		

*Description: * Different superscript letters in columns averaging showed significant difference (P <0.05)*

In Table 3, the greater the concentration of liquid smoke is used, the percentage of inhibition are also getting bigger. At a concentration of 1500 ppm liquid smoke showed the greatest inhibition percentage. This is presumably because of the large concentration of liquid smoke is used so that the condition of liquid smoke deepened the percentage inhibition of free radicals are also getting bigger. Results The intensity of concentration (IC_{50}) showed the number of 3589.709 ppm, the numbers look big enough. By the standards of [24] states that the antioxidant activity of the 6 (six) different concentrations of liquid smoke is relatively weak with IC_{50}> 200 ppm. IC_{50} value is defined as the concentration of test compounds that can reduce free radicals by 50%. The smaller the IC_{50} value of the free radical activity of the higher reduction [18]. Extracts with DPPH absorbance measurement using a UV-Vis spectrophoto meter previously conducted to determine the maximum wavelength DPPH. DPPH maximum wavelength used was at a wavelength of 515.5 nm. This gives the maximum wavelength of maximum absorbance of the test solution and provides the greatest sensitivity. Furthermore, the amount of the antioxidant activity of the extracts and positive control used was measured at a wavelength of maximum. Testing antioxidant activity can be accomplished by using the curbs free radical DPPH (Diphenylpicrylhydrazyl), [26] [27] [28] who based the principle works on samples containing compounds are antioxidants) that can reduce free radicals (DPPH). The method used in the testing activity. Antioxidant testing can be done by absorbance method DPPH radical because it is a method that is simple, easy, and using the samples in small quantities with a short time [29]. Measuring the antioxidant activity of samples carried out at a wavelength of 515 nm which is the wavelength of maximum DPPH, with DPPH concentration of 50 M. The presence of the antioxidant activity of the sample resulting in discoloration on DPPH solution in methanol were originally concentrated into a violet colored pale yellow [30].

c. Effect of purification and concentration of the liquid smoke. Test antioxidants (% inhibition) of liquid smoke cinnamon

Analysis of variance showed the combination treatment showed a concentration purification with the interaction of the antioxidant liquid smoke cinnamon. The interaction means between purification with a difference concentration jointly affect antioxidant liquid smoke. The average activity of antioxidant effect of combined treatment with different concentrations of purification of liquid smoke can be seen in Table 4, below.

Table 4.
Combination treatment of purification with different concentrations of liquid smoke to% inhibition (antioxidant) liquid smoke cinnamon

Purification	consentration	(%) inhibisi	IC $_{50}$ (ppm)	The Regresi Equationi
Destillation 100^{o}C	1 ppm	16.367±3,15 bcde	101.29	y = -0.2846x + 21.176 R² = 0.0145
	10 ppm	22.167±1,54 abcde	82.459	y = -0.331x + 22.706 R² = 0.0212
	100 ppm	24.3±1,08 abcde	278.81	y = 0.546x + 16.543 R² = 0.12
	500 ppm	24.9±1,21 abcde	403.32	y = -0.0698x + 21.848 R² = 0.0009
	1000 ppm	17.467±10,09 bcde	105.99	y = 0.2786x + 20.472 R² = 0.0111
	1500 ppm	13.167±3,31 de	43.12	y = 0.7749x + 16.584 R² = 0.1616
Destillation 140^{o}C	1 ppm	22.267±1,54 abcde	101.29	y = -0.2846x + 21.176 R² = 0.0145
	10 ppm	24.4±1,08 abcde	82.459	y = -0.331x + 22.706 R² = 0.0212
	100 ppm	25±1,21 abcde	278.81	y = 0.546x + 16.543 R² = 0.12
	500 ppm	17.367±10,26 bcde	403.32	y = -0.0698x + 21.848 R² = 0.0009
	1000 ppm	12.967±3,31 de	105.99	y = 0.2786x + 20.472 R² = 0.0111
	1500 ppm	32.8±2,82 bcde	43.12	y = 0.7749x + 16.584 R² = 0.1616
Activated charcoal filtering (AA)	1 ppm	24.833±2,16 abcde	101.29	y = -0.2846x + 21.176 R² = 0.0145
	10 ppm	28.8±5,03 abc	82.459	y = -0.331x + 22.706 R² = 0.0212
	100 ppm	17.3±10,14 bcde	278.81	y = 0.546x + 16.543 R² = 0.12
	500 ppm	13.3±3,55 de	403.32	y = -0.0698x + 21.848 R² = 0.0009
	1000 ppm	18.433±3,44 abcde	105.99	y = 0.2786x + 20.472 R² = 0.0111
	1500 ppm	23.4±0,96 abdde	43.12	y = 0.7749x + 16.584 R² = 0.1616
Activated charcoal filtering (AA+Zeolit)	1 ppm	17.8±3,50 a	101.29	y = -0.2846x + 21.176 R² = 0.0145
	10 ppm	10.7±1,37 e	82.459	y = -0.331x + 22.706 R² = 0.0212
	100 ppm	14.767±0,57 cde	278.81	y = 0.546x + 16.543 R² = 0.12
	500 ppm	19.7±0,72 abcde	403.32	y = -0.0698x + 21.848 R² = 0.0009
	1000 ppm	23.067±0,25 abcde	105.99	y = 0.2786x + 20.472 R² = 0.0111
	1500 ppm	24.767±0,78 abcde	43.12	y = 0.7749x + 16.584 R² = 0.1616
Filtering Zeolit (Z)	1 ppm	11.667±3,19 de	101.29	y = -0.2846x + 21.176 R² = 0.0145
	10 ppm	16.067±3,15 bcde	82.459	y = -0.331x + 22.706 R² = 0.0212
	100 ppm	21.467±3,65 abcde	278.81	y = 0.546x + 16.543 R² = 0.12
	500 ppm	25.4±2,59 abcd	403.32	y = -0.0698x + 21.848 R² = 0.0009
	1000 ppm	24.6±0,82	105.99	y = 0.2786x + 20.472 R² = 0.0111
	1500 ppm	22.067±9,11 abcde	43.12	y = 0.7749x + 16.584 R² = 0.1616
The deposition for 1 day	1 ppm	17.6±2,82 bcde	101.29	y = -0.2846x + 21.176 R² = 0.0145
	10 ppm	21.867±1,54 abcde	82.459	y = -0.331x + 22.706 R² = 0.0212
	100 ppm	24.333±1,09 abcde	278.81	y = 0.546x + 16.543 R² = 0.12
	500 ppm	28.267±4,36 abc	403.32	y = -0.0698x + 21.848

				$R^2 = 0.0009$
	1000 ppm	17.1±10,14 bcde	105.99	$y = 0.2786x + 20.472$ $R^2 = 0.0111$
	1500 ppm	13.433±3,88 de	43.12	$y = 0.7749x + 16.584$ $R^2 = 0.1616$
The deposition for 2 hari	1 ppm	22.867±0,25 abcde	101.29	$y = -0.2846x + 21.176$ $R^2 = 0.0145$
	10 ppm	25.567±1,42 abcd	82.459	$y = -0.331x + 22.706$ $R^2 = 0.0212$
	100 ppm	29.233±6,16 ab	278.81	$y = 0.546x + 16.543$ $R^2 = 0.12$
	500 ppm	12.5±1,04 de	403.32	$y = -0.0698x + 21.848$ $R^2 = 0.0009$
	1000 ppm	16.567±0,57 bcde	105.99	$y = 0.2786x + 20.472$ $R^2 = 0.0111$
	1500 ppm	21.333±0,55 abcde	43.12	$y = 0.7749x + 16.584$ $R^2 = 0.1616$
The deposition for 3 day	1 ppm	25.4±2,0 abcd	101.29	$y = -0.2846x + 21.176$ $R^2 = 0.0145$
	10 ppm	22.7±8,72 abcde	82.459	$y = -0.331x + 22.706$ $R^2 = 0.0212$
	100 ppm	13.333±3,37 de	278.81	$y = 0.546x + 16.543$ $R^2 = 0.12$
	500 ppm	17.733±2,57 bcde	403.32	$y = -0.0698x + 21.848$ $R^2 = 0.0009$
	1000 ppm	21.8±2,96 abcde	105.99	$y = 0.2786x + 20.472$ $R^2 = 0.0111$
	1500 ppm	24.6±2,26 abcde	43.12	$y = 0.7749x + 16.584$ $R^2 = 0.1616$

** Different superscript letters in columns averaging showed significant difference (P <0.05)*

In Table 4 shows that liquid smoke purification by distillation at a temperature of 140 ° C at a concentration of 1500 ppm yield (%) by 32.80% the largest inhibition with IC50 value of 43.12 ppm. Statistically significantly different treatment outcomes% lain. Sedangkan smallest inhibition of 10.7% with IC50 value of 82.459 ppm is generated by liquid smoke purification using activated charcoal (AA) mixed zeolite (Z) at a concentration of 10 ppm of liquid smoke. Differences in figures antioxidant liquid smoke obtained in a way different purification allegedly because of the higher concentration of liquid smoke is analyzed then obviously % inhibition (ability) inhibit the oxidation will be even greater. % Inhibition in amounts proportional to the concentration of liquid smoke cinnamon purified. By the standards of [24] states that the antioxidant activity in the purification of liquid smoke by distillation at a temperature of 140 ° C at a concentration of 1500 ppm considered to be very strong because of IC_{50} <50 ppm, whereas treatment purification liquid smoke using activated charcoal (AA) mixed Zeolite (Z) at a concentration of 10 ppm of liquid smoke relatively strong because the IC_{50} ranging between 50-100 ppm. Mechanism of action of antioxidants has two functions. The first function is the main function of the antioxidant as the giver of a hydrogen atom. Antioxidants (AH), which has the main function is often referred to as primary antioxidants. These compounds can provide rapid hydrogen atom to the lipid radicals (R *, ROO *) or convert it to forms more stable, while the radical derived antioxidants (A*) has a more stable state than lipid radicals. The second function is a secondary function of antioxidants, which slow the rate of autooksidasi the chain termination mechanism autooxidation the conversion of lipid radicals to form more stable [31]. The decline occurred on DPPH test absorbance due to the addition of electrons from the antioxidant compound in an unpaired electron in the nitrogen group in a compound structure DPPH. DPPH solution purple. The intensity of the color purple will decrease when the DPPH radical binds with hydrogen. The stronger the antioxidant activity of the sample, the greater the decrease in the intensity of the color purple [32]. DPPH radical reaction mechanism arrest by antioxidants is DPPH • + AH DPPH-H + A •. Most studies using DPPH scavenging activity of its report after a reaction 15 or 30 minutes [33].

CONCLUSION

1. The antioxidant activity of liquid smoke of 8 (eight) treatment purification and they are all strong because the IC_{50} of 55.92 ppm.
2. Levels of antioxidants liquid smoke of 6 (six) different concentrations of liquid smoke are all relatively weak as a result of activity antioxidant IC_{50} of 3589.7 ppm.
3. In the combined treatment of 8 (eight) purification with liquid smoke concentration of 1500 ppm produced IC 50 of 43.12 ppm belonging to produce strong antioxidant activity, the antioxidant activity of use purification distillation temperature of 140^{o}C at a concentration of 1500 ppm liquid smoke better use from the way other purification.

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