

## Soap Bar Making From Waste Cooking Oil For Residents Of 07 Area, Duri Pulo Sub-District, Jakarta

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### Abstract.

*Cooking oil that is no longer utilized can be used as a basic ingredient in the production of soap bar, and other products that can be used in daily life, such as washing clothes or kitchen utensils. The remainder of cooking oil, also known as waste cooking oil, is typically poured down the drain, where it can plug the drain since the oil freezes at low temperatures, causing environmental pollution. Based on this issue, the FTKE Universitas Trisakti community service team taught inhabitants of 07 Area, Duri Pulo Sub-district, Jakarta how to make bar soap from waste cooking oil. However, waste cooking oil cannot be used directly as an ingredient for creating soap because of the color and aroma, therefore it must be cleaned first by adding activated carbon, namely charcoal as an adsorbent, into the waste cooking oil to absorb the color and aroma. Later on, mix the oil and lye (a combination of NaOH and water), stir until the mixture resembles liquid soap, and then add around 1 ml of fragrance. Put the mixture in the drain. Leave the soap in the mold for 24 hours until it solidifies and hardens, then remove from the mold. It is intended that with this training, locals would be able to better their economic standing by saving more money while simultaneously helping to save the environment.*

**Keywords:** Waste Cooking Oil, Environment, Soap and Chemicals.

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### I. INTRODUCTION

The waste cooking oil is a sort of home waste produced as a result of frying meals using edible vegetable oil at high temperatures and is regularly disposed of (Yulia et al., 2023). Waste cooking oil is usually just thrown into the drain, which over time will clog the drain because the oil will freeze at low temperatures. Without realizing it, disposing of waste cooking oil directly into the drain will also pollute the surrounding environment (Maotsela et al., 2019). Cooking oil waste has a harmful impact on the environment (Evelyn et al., 2019). Water sources, drainage systems, and soil structures are all contaminated. One of the wastes produced by culinary operations is used cooking oil, which is cooking oil that has been repeatedly heated at high temperatures above 170°C, generating oxidation, hydrolysis, and polymerization processes that harm the oil (Mahmudah & Shofiah, 2023). As a result, an abundance of trash or wasted cooking oil can be converted into something useful (Azme et al., 2023).

Currently, it is a great idea to reuse waste cooking oil in order to conserve energy and protect the environment from pollution. Waste cooking oil might be recycled as a viable alternative raw material for a variety of applications, including biodiesel production, chemical raw materials, feed and demolition agents for concrete products, and low-cost raw materials for soap manufacturing (Li et al., 2020). In line with this problem, lecturers from FTKE Universitas Trisakti have conducted training on making soap from waste cooking oil for residents in densely populated housing complexes in 07 Area, Duri Pulo Sub-district, Central Jakarta. The goal of this program was to teach and train the community how to make dishwashing bar soap from waste cooking oil. This soap-making training aims to utilize waste cooking oil so that it can have more value and also reduce household waste. This waste cooking oil can be utilized by processing it into bar soap which can be used in everyday life.

## II. METHODS

The methods include a site inspection, training preparation, presentation, monitoring, and evaluation. This waste cooking oil cannot be used directly, because the color and aroma are very unattractive. Therefore, purification has been carried out first by adsorption, namely by adding activated carbon (charcoal) as an adsorbent which functions to absorb the color and aroma of waste cooking oil. This process has been carried out for approximately 24 hours by inserting charcoal that has become coals into the waste cooking oil so that the charcoal can absorb the aroma and color of the waste cooking oil, although the color of the waste cooking oil will not change to clear. Apart from waste cooking oil, the ingredients used are NaOH (caustic soda), mineral water, and fragrance oil as a fragrance (optional) as base ingredients for making a bar soap. Soap is a salt of fatty acids. Soap is historically produced by reacting fats or oils with bases (NaOH or KOH). The reaction that happens is known as saponification. The saponification reaction occurs when fat/triglycerides combine with NaOH and KOH to create soap (Rahayu et al., 2021). Furthermore, to calculate the composition of the soap using the soap calculation application from <http://www.soapcalc.net> as shown in Figure 1.

Total oil weight		372 g		Sat : Unsat Ratio		89 : 11	
Water as percent of oil weight		38.00 %		Iodine		10	
Super Fat/Discount		5 %		INS		258	
Lye Concentration		31.418 %		Fragrance Ratio		0.5	
Water : Lye Ratio		2.1829:1		Fragrance Weight		0.19 g	
		Pounds	Ounces	Grams			
Water		0.312	4.99	141.36			
Lye - NaOH		0.143	2.28	64.76			
Oils		0.820	13.12	372.00			
Fragrance		0.000	0.00	0.19			
Soap weight before CP cure or HP cook		1.275	20.40	578.31			
#	✓	Oil/Fat	%	Pounds	Ounces	Grams	
1	✓	Coconut Oil, 76 deg	100.00	0.820	13.12	372.00	
Totals			100.00	0.820	13.12	372.00	
Soap Bar Quality		Range	Your Recipe	Lauric		48	
Hardness		29 - 54	79	Myristic		19	
Cleansing		12 - 22	67	Palmitic		9	
Conditioning		44 - 69	10	Stearic		3	
Bubbly		14 - 46	67	Ricnoleic		0	
Creamy		16 - 48	12	Oleic		8	
Iodine		41 - 70	10	Linoleic		2	
INS		136 - 165	258	Linolenic		0	
Additives				Notes			

Fig. 1 Soap Ingredients Calculation

The calculation for this ingredient is based on the maximum volume that can be accommodated by the mold, namely 600 grams. The ingredients needed are as follows: mineral water 141 grams; NaOH 65 grams; the waste cooking oil 372 grams; fragrance oil approximately 1 ml. The steps for soap making can be seen in Figure 2.



Fig 2. The steps of the soap making

According to the Figure 2, here are several steps for the soap making as follows:

1. Prepare 141 grams of mineral water.
2. Weigh 65 grams of NaOH.
3. Add NaOH to mineral water (must be water first then NaOH).
4. The mixture of water and NaOH (lye solution) will make the solution cloudy.
5. Stir well until the water is clear again. The mixture will cause heat, temperature of about 70°C.
6. Weigh 372 grams of waste cooking oil.
7. Mix the oil and lye (a mixture of NaOH and water), stir until the mixture is like liquid soap, then add approximately 1 ml of fragrance.
8. Put the mixture into the mold.
9. Leave the soap in the mold for 24 hours until the soap becomes solid and hard, then remove the soap from the mold.

### III. RESULT AND DISCUSSION

This training was carried out with the target of housewives, therefore they can able to increase their knowledge of the benefits of waste cooking oil and make them into goods that have added value. Apart from that, it is hoped that this activity can foster an entrepreneurial spirit for housewives. Soap samples were taken before field activities because soap making requires a curing process - as the waiting period after the soap becomes solid, is at least 45 days. This community service was carried out with presentations and questions and answers from the participants. The presentation was accompanied by a live soap-making demonstration by the community service team as shown in Figure 3.



**Fig 3.** Soap making presentation and demo

This training is the basic capital for entrepreneurship for housewives in the local area. After the training was carried out, the team distributed five complete sets of equipment for soap-making and represented by the head of housewives' community (Figure 4), which the participants could do independently after the training was completed.



**Fig 4.** The symbolize giving of soap making equipments

#### IV. CONCLUSION

The enthusiasm of the housewife community in Area 07, Duri Pulo Sub-district during the training indicated that this training was very interesting for them and increased their knowledge of other benefits than waste cooking oil which until now they had only thrown into the drain. With this activity, it is hoped that the housewife can continue to practice and develop their basic knowledge of soap making to become entrepreneurs so they can increase their income by utilizing waste cooking oil.

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