

Eco-Friendly and natural Toilet Soap Formulation with Used Cooking Oil and Natural Additives

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Structured Abstract

Background: The improper disposal of used cooking oil (UCO) significantly contributes to environmental pollution, including water and soil contamination. In Malaysia alone, more than 50,000 tonnes of UCO are discarded annually without proper treatment. This study proposes an environmentally sustainable solution by repurposing UCO into natural toilet soap. To improve skin compatibility and functionality, natural additives—turmeric and cinnamon powders—were incorporated due to their known antioxidant, antimicrobial, colorant, and fragrance properties. The research aims to promote waste valorisation by converting household waste into a skin-safe hygiene product.

Methods: Toilet soap was formulated via cold saponification using pretreated UCO, sodium hydroxide (NaOH), and distilled water. Six formulations were produced with turmeric and cinnamon incorporated at concentrations of 5%, 10%, and 15%. The soaps were cured for three weeks prior to testing. Physicochemical evaluations included pH, foam height, moisture content, and total fatty matter (TFM). Additionally, consumer perception was assessed through a structured sensory evaluation involving 30 participants, who rated the soaps on scent, texture, cleansing performance, and overall appeal.

Results: All formulations complied with Malaysian and ISO quality standards. The pH values ranged from 8.2 to 9.4, indicating safe alkalinity for skin application. Foam heights exceeded 100 mm, suggesting effective cleansing capacity. Moisture content decreased with higher additive concentrations (10.3%–16.1%), potentially improving product shelf life. TFM values surpassed 80%, reflecting good moisturizing potential and overall product quality. Consumer feedback was favorable, with over 80% of respondents expressing satisfaction in all sensory categories.

Conclusion: This study confirms the feasibility of transforming UCO into eco-friendly, high-quality toilet soap enhanced with natural additives such as turmeric and cinnamon. The resulting formulations meet quality standards and enjoy high consumer acceptance, supporting their practical application. This approach provides a dual benefit of reducing environmental waste while promoting safe and sustainable personal care products.

Keywords: Used Cooking Oil, Natural Additives, Turmeric, Cinnamon, Toilet Soap

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