

## NOVEL METHOD FOR DIFFERENTIATION OF REFINED FRESH AND USED COCONUT OIL BASED ON MALAPRADE OXIDATION MECHANISM

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Coconut oil is widely used for cooking. The refining, bleaching, and deodorization (RBD) process transforms crude coconut oil into a colorless, odorless, and tasteless refined coconut oil favoured in culinary applications. However, the unethical practice of refining used coconut oil, which was previously exposed to high-temperature cooking, and marketing it as refined fresh oil raises concerns over consumer safety. Used oil undergoes oxidative degradation and polymerisation, generating carcinogenic lipid compounds. Long-term consumption of such adulterated oil poses significant health risks, including oxidative stress, hypertension, inflammation, and genetic mutations. Current quality control parameters fail to distinguish between refined fresh coconut oil and refined used coconut oil. This study presents a novel quality assurance method to differentiate these two types of oil based on their monoglyceride content. During repeated heating, oils accumulate monoglycerides due to triglyceride breakdown. The refining process does not eliminate glycerides. Therefore, monoglyceride content is a potential marker of used oil. Using sodium periodate as the oxidising agent, 1-monoglycerides were selectively oxidised by Malaprade oxidation to generate aldehydes, which were then quantified spectrophotometrically and evaluated qualitatively using a reference colour chart for 75 refined fresh and used oil samples. Refined used oil showed a significantly higher level of monoglycerides ( $1.58 \pm 1.05$  at  $p \leq 0.05$ ) than that of refined fresh oil ( $0.16 \pm 0.03$ ). Logistic regression analysis demonstrated high diagnostic accuracy of 1.00, with a receiver operating characteristic area under the curve. The method yielded 100% sensitivity, specificity, positive predictive value and negative predictive value at an absorbance cut-off of 0.31. This novel, cost-effective technique enables regulatory authorities and manufacturers to assess the quality of coconut oil and authenticate the source of refined oil to ensure consumer safety.

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