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**ENZYMATIC GLYCEROLYSIS OF VEGETABLE OILS AND ITS
APPLICATION IN THE PRODUCTION OF HIGHLY UNSATURATED
CHOCOLATE SPREADS**

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Chocolate spreads have traditionally been high in saturated fats, prompting modern formulations to focus on reducing and replacing trans fats. One innovative method used in these efforts is enzymatic glycerolysis. This process involves transforming native triacylglycerols (TAGs) into monoacylglycerols (MAGs) and diacylglycerols (DAGs). Utilizing high oleic sunflower oil as the TAG source, along with 99.97% pure glycerol and the enzyme Lipozyme® RM as a catalyst, this reaction is performed at 50°C and 130 rpm for 10 hours. The glycerol and triacylglycerol are kept at a 1:1 molar ratio during the process.

The modified fats are then analyzed using Thin Layer Chromatography (TLC), which helps identify the proportions of different molecules. After ten hours, the analysis showed 20.11% MAGs, 55.4% DAGs, 22.34% TAGs, and 2.12% free fatty acids.

These enzymatically modified fats are incorporated into a new chocolate spread formulation using a Spectra 11– Stone Grinders machine. The recipe includes 23.23% of the glycerolysed product, along with 33.10% sugar, 12.96% hazelnut paste, 11.85% milk powder, 0.37% lecithin, 11.84% cocoa powder, and 6.66% soy flour. The resulting product undergoes several evaluations for texture, thermal behavior, and sensory attributes.

Texture analysis is conducted using a TA.HD Plus Texture Analyzer equipped with Exponent software and a TTC Rig attachment. Initial calibration involves an empty female cone, and samples are tested in a female cone at a 90° angle to prevent air bubbles. The male cone penetrates the sample at a speed of 3.0 mm/s to measure hardness (in Newtons) and spreadability (area under the curve).

Thermal behavior is assessed using a Differential Scanning Calorimeter (DSC), which measures changes in physical properties as a function of temperature and time. This device compares the heat absorbed or emitted by the sample to a reference, focusing on the melting point of the chocolate spread.

Sensory attributes are evaluated through Quantitative Descriptive Analysis. A panel of fifteen trained individuals use a 12-cm line scale to assess the sensory qualities of the spread. Participants receive 20 g samples at room temperature, each labeled with a unique 3-digit code. Water and biscuits are provided to cleanse the palate between tastings. A consumer test follows,

where attributes such as appearance, aroma, flavor, and overall acceptability are rated using samples served with bread at room temperature.

Results show that the melting point of the spread is 36.9°C, indicating good stability. However, the texture measurements suggest that firmness and spreadability are slightly lower compared to commercial products, possibly due to particle content. Despite this, sensory analysis shows strong consumer acceptance, likely due to the reduced sugar and increased cocoa content, aligning with preferences for healthier options.