

OPTIMIZING THE TEXTURAL PROPERTIES OF SPREAD WITH DIFFERENT EMULSIFIERS

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ABSTRACT

Cheese spreads represent a significant segment of the food industry, encompassing a diverse range of products enjoyed globally. The textural properties of spreads play a vital role in consumer acceptance and satisfaction. Emulsifiers are key ingredients that significantly influence the texture and stability of spreads. The aim of the study is to optimize the textural properties of spread formulations using various emulsifiers. By analyzing the finished product in different ways, we can find the optimized product. Texture analysis, moisture, water activity, and microbial analysis to find the quality of the different emulsifiers used. In this research, sodium citrate (E331), tri-sodium citrate (E331 iii) and sodium phosphate (E339) were specifically chosen for the study. Emulsifiers act as essential stabilizers in these emulsions, forming the backbone of most spreads. Consumers will experience a significantly enhanced sensory experience due to the superior texture. We can potentially reduce production costs and enhance product stability through the selection of the most appropriate emulsifier. Furthermore, optimal textural properties were achieved through the strategic combination of emulsifiers, harnessing their synergistic effects. The study also found that the emulsifiers played a crucial role in controlling the viscosity and consistency of the spreads. By understanding the interactions between different emulsifiers we can make the products to meet consumer preferences more effectively. We will create different formulas to make different trials by doing trial and error to find the characteristics for the individual products by analysis. Then we can finally create spreads that not only have improved texture but also increase shelf life by the use of testing equipment that we have already chosen. This innovative approach to emulsifier selection can lead to a competitive advantage in the market by offering products that meet both consumer preferences and industry standards.

Keywords: Cheese, Texture properties, Shelf life, Spread, Emulsifier, Consumers, Sensory.

1. INTRODUCTION

Cheese spread's creamy texture and versatility make it a popular food product enjoyed by people all over the world. Consumer acceptance of cheese spread is significantly influenced by its textural qualities, which also affect spreadability, mouthfeel, and the whole sensory experience. Emulsifiers are essential components that improve the texture and stability of cheese spreads. By using three different emulsifiers—E331 (sodium citrate), E331 iii (tri sodium citrate), and E339 (sodium phosphate)—and adjusting their ratios, this project seeks to maximize the textural qualities of cheese spread. Emulsifiers are vital ingredients in food formulations because they help fat molecules dissolve in water-based solutions and keep the mixture from separating or inverting phases. Sodium citrate (E331), which has emulsifying and buffering qualities, is frequently used in food processing to give dairy products a smooth texture and longer shelf life. Tri sodium citrate (E331 iii), a sodium citrate derivative, improves the homogeneity and

consistency of cheese spreads by acting as an emulsifier and stabilizer. Sodium phosphate (E339) is another emulsifier commonly utilized in food production, known for its ability to improve texture, moisture retention, and shelf stability in dairy products. Understanding the impact of different emulsifiers on the textural properties of cheese spread is crucial for product development and optimization. By systematically varying the ratios of these emulsifiers in cheese spread formulations, this project aims to investigate their effects on spreadability, creaminess, viscosity, and overall sensory attributes. Additionally, the study will assess the shelf life of the cheese spreads formulated with different emulsifier combinations, considering factors such as microbial growth, lipid oxidation, and sensory deterioration over time. The optimization of textural properties in cheese spread holds significant implications for the food industry, offering opportunities to enhance product quality, consumer satisfaction, and market competitiveness. Through this project, valuable insights will be gained into the role of emulsifiers in cheese spread formulations, facilitating the development of innovative products with improved texture and extended shelf life. Moreover, the findings of this study can contribute to the advancement of food science and technology, providing valuable information for future research and product innovation in the dairy industry.

1.1 Objectives

The project aim is to optimize the textural properties of spread by using different emulsifiers. This process will help to find the suitable emulsifier by comparing the physical and chemical properties of the product by analyzing it with different product formulations, temperature etc.,. This will increase the product's quality and the consumer's demand.

- The objective of this study is to optimize the textural properties of spread using various emulsifiers.
- By investigating different emulsifiers, this research aims to identify the most effective ones for achieving desired textural characteristics such as spreadability, creaminess, and mouthfeel.
- To study seeks to enhance the overall quality of spreads by optimizing their texture through the selection and utilization of suitable emulsifiers..

1.2 Scope of the project

The scope of the project involves studying and enhancing the textural aspects such as smoothness, consistency, and overall feel of the spread. Develop and enhance the sensory value of the spread. Enhance the shelf life using different emulsifiers by developing different trials. Investigate the different emulsifiers on the textural characteristics, moisture characteristics and microbial properties.

2. MATERIALS AND METHODOLOGY

The methodology involves conducting a series of experiments to evaluate the effects of various emulsifiers on the textural properties of spreads. Initially, different emulsifiers will be selected based on their functionality and compatibility with spread formulations. These emulsifiers will then be incorporated into spread samples at varying concentrations, and the textural properties of each sample will be assessed using techniques such as texture analysis, moisture analysis, water activity etc.,. The effects of emulsifiers on spreadability, consistency, creaminess, and other relevant textural attributes will be systematically analyzed to determine the optimal combination for achieving desired texture. Additionally, physicochemical analyses will be conducted to understand the underlying mechanisms influencing the textural properties of spreads formulated with different emulsifiers. Overall, this methodology aims to provide valuable insights into optimizing the textural properties of spreads through the strategic use of emulsifiers.

- Raw material collection
- Weighing of ingredients
- Different weight ratio using the emulsifiers
- Formulation
- Cheese, Butter, Milk, Emulsifiers
- Preparing different trail using each emulsifier
- Product development
- Storage
- Product analysis (Texture analysis, moisture content analysis, water activity analysis, pH and microbial analysis)

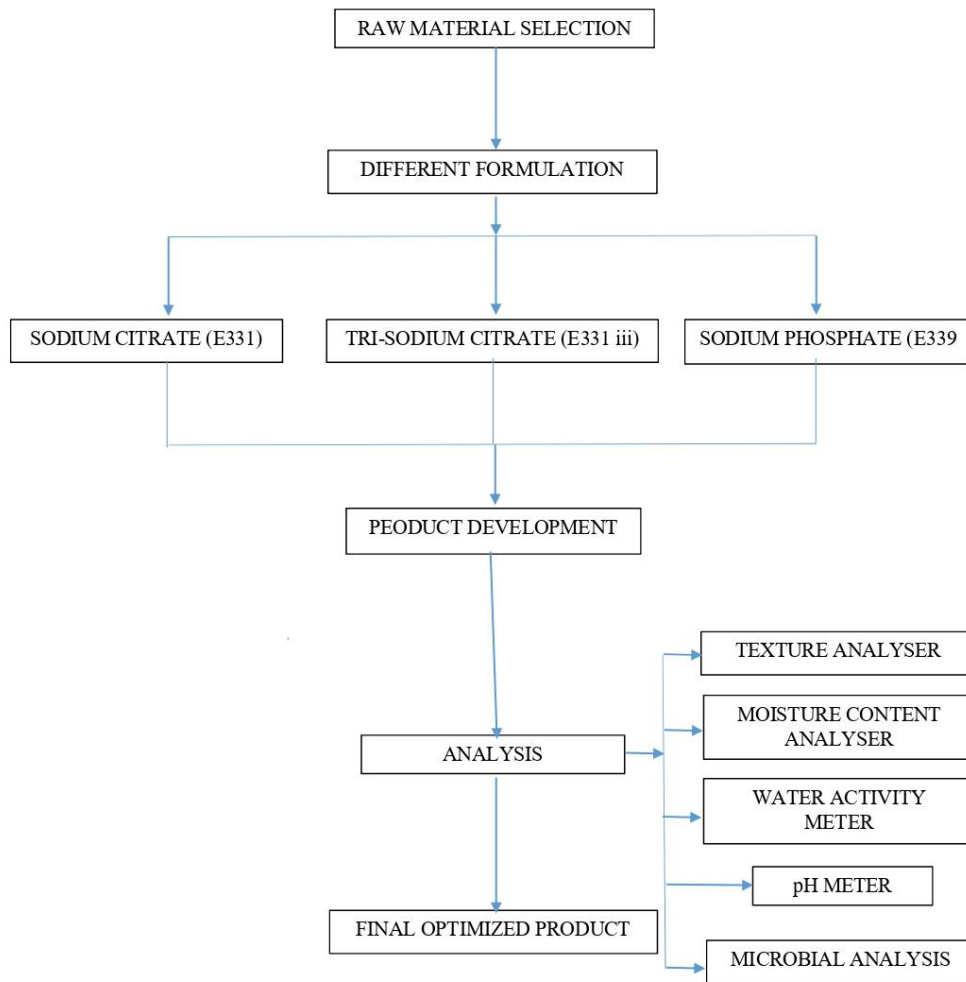


Fig-1: Ingredients with different ratio



Fig-2: Developed product

3. RESULT AND DISCUSSION

The result obtained during investigation of “Optimizing The Textural Properties Of Spread With Different Emulsifiers” will be shown in this. By analyzing the different products that are made by different emulsifiers, different product ratio and formulation are finally given the results. These values and readings are collected by doing different testing to find the product's quality and to compare the products. We did texture analysis, moisture analysis, water activity analysis and microbial analysis to read the correct and right value for the product. The main objective for this project is to find the right emulsifier that improves the produce quality and taste. We use Sodium citrate, Tri-Sodium citrate, Sodium phosphate to the product as different emulsifiers. These emulsifiers are widely used in the already existing many food products in different roles. By comparing the products' different trials the result of the study was shown in the value. By the analysis done in different equipment to find the right. From that the tri-sodium citrate from this was giving good output and result for the product. So the product's stability, texture, water activity, moisture content and the bacterial growth was good, compared to the sodium citrate and sodium phosphate. So for product development tri-sodium citrate can be used to get good product quality. So the availability of the raw material is easy and the cost of the raw material is not high so the product's price and quality was not affected by the availability. So the companies from the local and the startup's business can develop easily and quickly.

3.1 ANALYSIS OF TEXTURE

Table -1: Texture analysis value

ANALYSIS	EMULSIFIER USED	TRIAL 1	TRIAL 2
Texture analysis	Sodium citrate (E 331)		
	Tri-sodium citrate (E 331 iii)		
	Sodium phosphate (E 339)		

3.2 ANALYSIS OF MOISTURE, WATER ACTIVITY & pH

Table -2: Moisture content, Water activity and pH

ANALYSIS	EMULSIFIER USED	TRIAL 1	TRIAL 2
Moisture content	Sodium citrate (E 331)	MC= 24.27%	MC= 21.14%
	Tri-sodium citrate (E 331 iii)	MC= 16.81%	MC= 15.60%
	Sodium phosphate (E 339)	MC= 14.81%	MC= 19.77%

Water activity	Sodium citrate (E 331)	0.895	0.761
	Tri-sodium citrate (E 331 iii)	0.945	0.883
	Sodium phosphate (E 339)	0.926	0.916
pH	Sodium citrate (E 331)	5.03	5.06
	Tri-sodium citrate (E 331 iii)	5.04	5.05
	Sodium phosphate (E 339)	5.06	5.05

3.3 ANALYSIS OF MICROBIAL PLATE COUNT

Table -3: Microbial analysis

ANALYSIS	EMULSIFIER USED	TRIAL 1	TRIAL 2
Microbial plate count	Sodium citrate (E 331)	17	47
	Tri-sodium citrate (E 331 iii)	27	35
	Sodium phosphate (E 339)	69	50

4. CONCLUSIONS

This project exhibits the analysis of textural and qualitative properties of spread produced by using different kinds of emulsifiers that are commercially used in baking and confectionery industries. There are different kinds of emulsifiers used in the commercial industries for the texture and effective emulsification of food products. Sodium citrate, Tri-Sodium citrate, Sodium phosphate are some of the common emulsifiers used in for the emulsification of cheese spread. This project initiated with the production of spread by using different kinds of emulsifiers. Texture of the product was analyzed by using texture analysis equipment. pH value of the products were monitored by using pH analyser. Microbiological analysis was performed to quantify the type of microorganisms that develop in the product.

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