

Process Standardization of Instant Beverage Cubes

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Abstract— Instant beverage cubes have emerged as a convenient and versatile option for delivering diverse flavors in a portable and compact format. This study focuses on the process standardization of three distinct instant beverage cubes: Mojito, Coffee, and Orange-Nutmeg. Each cube represents a unique combination of flavors, requiring precise formulation and processing techniques to ensure consistency and quality across batches. The standardization process involves a comprehensive approach consisting of ingredient selection, formulation, optimization, and process parameter control. Key considerations include the sourcing of high-quality ingredients, such as fresh mint leaves, tangy oranges, aromatic nutmeg, pure honey and premium jaggery, to achieve the desired flavor profiles and nutritional characteristics. Through systematic experimentation and statistical analysis, the optimal formulation for each beverage cube is determined. This involves evaluating factors such as sugar content, acidity, dissolution rate, and sensory attributes to meet consumer expectations and preferences. This standardization process not only enhances product quality but also facilitates scalability and reproducibility for commercial production.

Keywords: - standardization, scalability, flavor profiles, statistical analysis, experimentation.

1.Introduction

In today's fast-paced world, consumers seek convenience without compromising on quality when it comes to their beverage choices. Traditional syrups for flavoring beverages often present challenges in terms of storage, transportation, and precise dosing. Beverage cubes are small sugar and jaggery based cubes designed to enhance the consumption experience of various beverages. Beverage cubes come in various shapes, sizes, and compositions, including water-based, flavored, or even infused with additional ingredients like fruits, herbs, or edible flowers, offering versatility and customization options to suit different tastes and preferences. This research paper focuses on the process standardization of three distinct instant beverage cubes: Mojito, Orange-Nutmeg-Honey, and Jaggery Coffee. Key to the success of this standardization process is the meticulous selection of ingredients and formulation optimization. By sourcing high-quality ingredients such as fresh mint leaves, tangy oranges, aromatic nutmeg, pure honey, and premium jaggery, these

cubes offer a superior alternative to traditional syrups. The process standardization of instant beverage cubes represents a significant advancement in the beverage industry, offering consumers a convenient and sustainable alternative to market-bought syrups. By providing consistent quality and precise dosing, these cubes meet the evolving demands of modern consumers for convenience, flavor diversity, and environmental responsibility. This research paper aims to delve into the formulation and processing techniques necessary to achieve standardized instant beverage cubes, thereby paving the way for their widespread adoption in the market.

2.Materials & Methods: -

- Lemon powder
- Mint extract
- Salt
- Castor sugar
- Orange powder
- Nutmeg powder
- Honey
- Instant coffee
- Milk powder
- Jaggery

2.1.Formulations: -

2.1.1. Table.1: Orange-Nutmeg-Honey cubes (Hot-water based): -

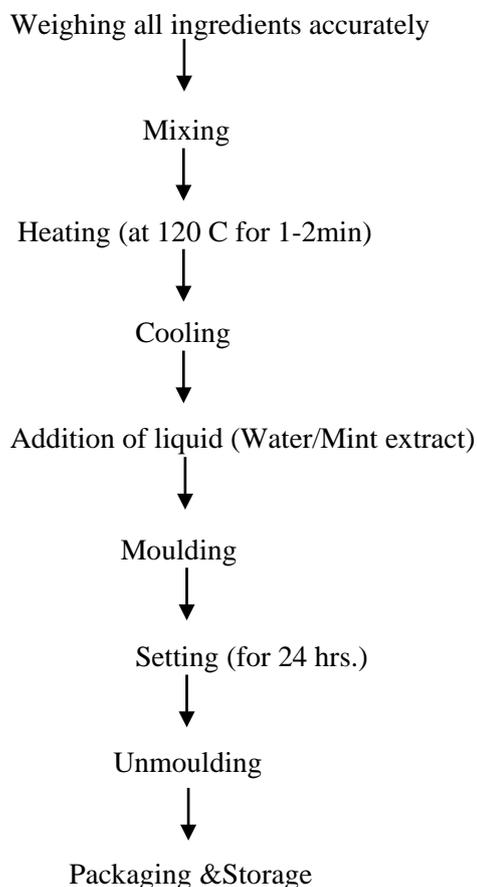
2.1.2. Table.2: Instant coffee cubes (Hot / cold water-based as well as milk-based product): -

Ingredients	Weight in grams	Percentage
Instant coffee	4.5g	3.93%
Milk powder	10g	8.73%
Jaggery	80g	69.86%
Sugar	20g	17.48%

2.1.3. Table.3: Mojito cubes (Cold water / Soda based product): -

Ingredients	Weight in grams	Percentage
Lemon powder	15g	11.54%
Mint powder	10g	7.69%
Salt	5g	76.92%
Sugar	100g	3.85%

2.2. Processing Flowchart: -



3. Trials: -



Fig.1: Instant beverage cubes: Coffee, Orange-Nutmeg, Mojito



Fig.2: Mojito Instant beverage cubes

Ingredients	Weight in grams	Percentage
Orange powder	15g	12.04%
Nutmeg powder	2g	1.61%
Honey	7.5g	6.02%
Sugar	100g	80.33%



Fig.3: Freshly made Mint powder, Lemon powder, Orange powder

4. Health benefits: -

4.1. Raw materials benefits: -

4.1.1. Lemon: -

- Rich source of vitamin C, which is known for its antioxidant properties. Antioxidants help protect cells from damage caused by free radicals and support the immune system.
- It can stimulate the production of digestive juices and help alleviate indigestion.

4.1.2. Mint: -

- Mint has traditionally been used to aid digestion. It can help relax the muscles of the digestive tract, reducing symptoms of indigestion and bloating.

4.1.3. Sugar: -

- Sugar provides a quick source of energy.

4.1.4. Orange: -

- Rich in vitamin C, promoting a healthy immune system.
- Contains antioxidants that may help reduce inflammation.
- Provides natural sweetness without added sugars, supporting better blood sugar control.

4.1.5. Nutmeg: -

- Exhibits anti-inflammatory properties, potentially aiding in pain relief.
- May have antimicrobial properties, supporting a healthy immune system.
- Contains minerals like potassium, calcium, and manganese for overall well-being.

4.1.6. Honey: -

- Natural energy source due to its blend of glucose and fructose.

- Exhibits antimicrobial and antioxidant properties, beneficial for immune health.
- May help soothe sore throats and coughs, acting as a natural cough suppressant.

4.1.7. Coffee: -

- Instant coffee is rich in antioxidants, which may help in neutralizing harmful free radicals in the body.
- Caffeine in coffee can enhance mental alertness and improve mood.

4.1.8. Milk powder: -

- Milk powder provides essential nutrients like calcium and vitamin D, promoting strong bones and teeth.
- It contributes to muscle development and repair, aiding in overall body strength.

4.1.9. Jaggery: -

- Jaggery is a healthier alternative to refined sugar, providing sweetness without causing rapid spikes in blood sugar levels.
- Jaggery contains iron, which can help prevent iron deficiency anemia.

5. Table no.4: Comparison between beverage cubes vs. syrups: -

Beverage cubes	Syrups
More convenient and portable	Quite complicated to carry and use
More concentrated flavour	Less concentrated flavour
Easy to store	Need particular environment for storage
No need of measuring for use	Always measure before use
Sugar content less compared to syrups	High sugar content
Less expensive	Expensive
Can be consumed in various forms	Need to dilute and consume

6. Advantages: -

6.1. Flavored beverage cubes offer several benefits:

6.1.1. Convenience:

Beverage cubes provide a convenient way to add flavor to drinks without the need for measuring or mixing syrups or powders.

6.1.2. Portability:

Beverage cubes are easy to store and transport, making them ideal for picnics, parties, and on-the-go use.

6.1.3. Customization:

With flavored beverage cubes, you can easily customize the flavor intensity of your drink by adding more or fewer cubes according to your preference.

6.1.4. Control over dilution:

Unlike ice cubes, flavored beverage cubes add flavor without diluting the drink, allowing you to enjoy a consistently flavorful beverage from start to finish.

6.1.5. Versatility:

Flavored beverage cubes can be used in a wide range of drinks, including cocktails, mocktails, water, iced tea, and more, making them a versatile addition to any beverage repertoire.

6.1.6. Longer-lasting flavor:

Beverage cubes typically dissolve slowly, releasing flavor gradually as they melt, which can prolong the enjoyment of the drink without becoming overly diluted.

6.1.7. Reduced waste:

Using flavored beverage cubes can help reduce waste compared to using single-serving flavor packets or bottles of syrup, as you can use only what you need and save the rest for later

7. Sensory Analysis: -

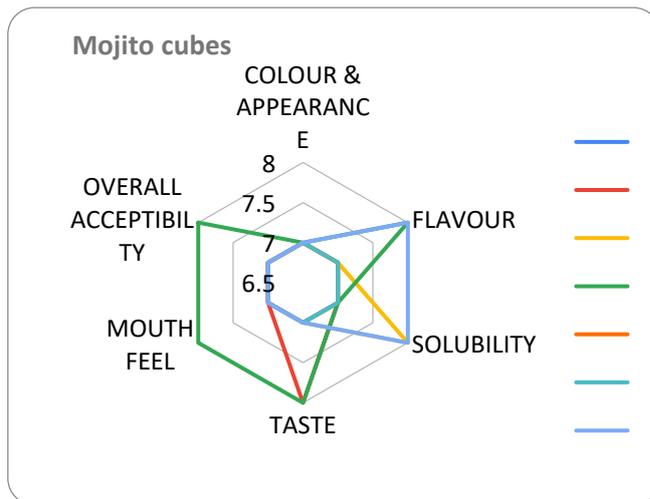


Fig no 4: Sensory analysis for Instant Mojito cubes

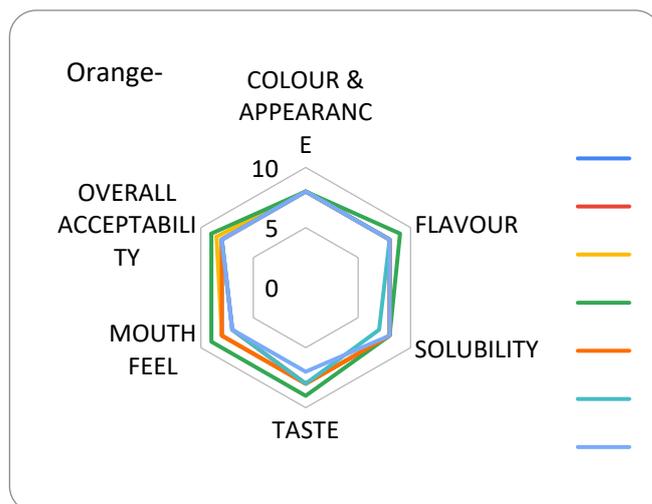


Fig no.5: Sensory analysis for Instant Orange-Nutmeg cubes

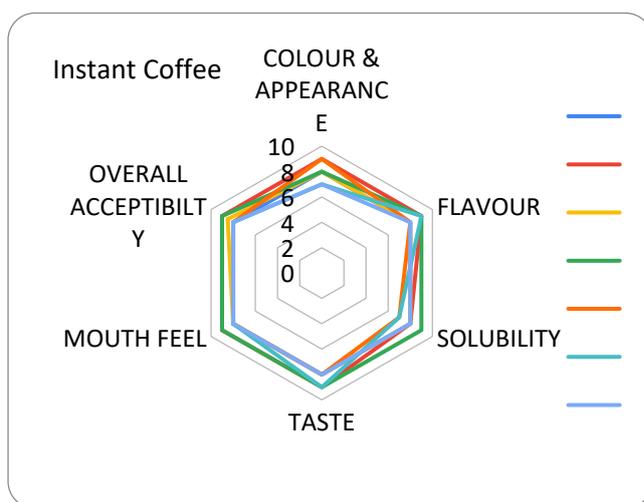


Fig no.6: Sensory analysis for Instant Coffee cubes

Sensory evaluations of instant beverage cubes, encompassing varieties such as Mojito, Orange-Nutmeg-Honey, and instant coffee, showcased participants consistently expressing positive sentiments across various attributes. Utilizing a 9-point hedonic scale, evaluations covered critical aspects including colour and appearance, flavour, solubility, taste, mouthfeel, and overall acceptability. For the Mojito cubes, results revealed consistently high ratings, particularly for taste, with an average score of 7 to 8, reflecting a generally positive perception. Similarly, the Orange-Nutmeg-Honey cubes garnered praise for their exceptional taste, with average ratings ranging from 8 to 9, indicating strong approval from participants. Solubility and mouthfeel were also commended, showcasing the cubes' ability to dissolve effectively and provide a pleasing texture. Meanwhile, the sensory evaluation of instant coffee cubes showcased remarkable consistency in high ratings across all attributes, particularly flavour and taste, which consistently earned top scores of 8 to 9. With overall acceptability averaging around 8.5, participants exhibited a strong preference for the coffee cubes, indicative of their potential for widespread consumer satisfaction and market success. These collective results underscore the appeal and quality of instant beverage cubes, affirming their potential to cater to diverse consumer preferences and preferences.

8. Market Potential: -

The market potential for standardized instant beverage cubes presents a compelling opportunity for both consumers and manufacturers alike. With the growing demand for convenience and premium-quality beverages, these cubes offer a unique value proposition that addresses the limitations of traditional market-bought syrups. Consumer preferences are shifting towards products that offer convenience without compromising on taste or quality. Instant beverage cubes meet this demand by providing a convenient, mess-free solution for flavoring beverages. The versatility of instant beverage cubes extends beyond individual consumers to catering services, restaurants, cafes, and hospitality establishments. By replacing

cumbersome syrup bottles with standardized cubes, businesses can streamline their operations, reduce waste, and enhance the overall customer experience. From a manufacturing standpoint, the production of instant beverage cubes offers scalability, efficiency, and cost-effectiveness. With standardized processes in place, manufacturers can optimize production workflows, minimize ingredient waste, and ensure batch-to-batch consistency. Additionally, the compact nature of the cubes allows for easier storage, transportation, and distribution compared to bulky syrup bottles. By eliminating the need for single-use syrup bottles, these cubes contribute to reducing plastic waste and carbon emissions associated with transportation. The market potential for standardized instant beverage cubes is vast and multifaceted. By offering a convenient, high-quality alternative to market-bought syrups, these cubes are poised to capture the interest of discerning consumers and drive innovation in the beverage industry.

9. Conclusion: -

In conclusion, the process standardization of instant beverage cubes represents a significant advancement in the beverage industry, offering consumers a convenient, versatile, and high-quality alternative to market-bought syrups. Through meticulous formulation optimization and rigorous quality control measures, manufacturers can ensure consistency, flavor diversity, and environmental sustainability in their products. The research presented in this paper demonstrates the feasibility and potential of standardized instant beverage cubes, with a focus on three distinct flavors: Mojito, Orange-Nutmeg-Honey, and Jaggery Coffee. Each cube encapsulates a unique combination of flavors, carefully crafted to meet consumer preferences for taste, aroma, and quality. The convenience, precision dosing, and portability offered by instant beverage cubes make them an attractive option for consumers seeking premium-quality beverages on the go. As the beverage industry continues to evolve, instant beverage cubes are poised to play a pivotal role in shaping consumer preferences and market trends. By innovation, sustainability, and quality assurance, manufacturers can leverage the market potential of standardized instant beverage cubes to drive growth, differentiation, and consumer satisfaction in the years to come.

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