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Formulation and Optimization of Energy Jelly for Enhanced Nutritional Delivery

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ABSTRACT:

The growing demand for convenient, nutrient-dense food products has driven innovation in functional foods, particularly among active individuals, athletes, and health-conscious consumers. This study focuses on the formulation and optimization of an energy jelly designed to deliver enhanced nutritional benefits in an easily consumable form. Utilizing a blend of carbohydrates, proteins, electrolytes, and vitamins, the energy jelly was developed to provide rapid energy release and sustained nutritional support. Key ingredients included glucose, maltodextrin, whey protein isolate, sodium, potassium, and B-complex vitamins, embedded within a gel matrix formed by natural gelling agents such as pectin and carrageenan.A response surface methodology (RSM) was employed to optimize the formulation for desired characteristics such as texture, taste, stability, and nutritional profile. Sensory evaluation and physicochemical analyses were conducted to assess product acceptability and efficacy. Results indicated that the optimized energy jelly provided a balanced nutrient composition with favorable organoleptic properties and stable shelf life, making it suitable for pre- and post-workout consumption or as a quick energy source during physical exertion. This study demonstrates the potential of energy jelly as an innovative functional food product for targeted nutritional delivery.

Keywords: Rasberry, enery gelly, RSM, Nutritions

I. INTRODUCTION:

Energy Jelly is a novel, chewable energy supplement providing a quick and sustained energy boost. It's a convenient, healthy alternative to traditional energy drinks and supplements.

Energy Jelly's unique jelly-like texture and fruity flavors make it enjoyable to consume. It's perfect for students, athletes, and professionals needing an energy boost.

The supplement combines natural ingredients like glucose, potassium citrate, sugar, veg gelatin, natural flavor, salt and Natural cherry red food color to enhance energy, mental clarity, and physical performance.

Unlike traditional energy drinks, Energy Jelly provides a sustained energy boost lasting several hours.

With its unique formulation and convenient packaging, Energy Jelly revolutionizes the energy supplement market, offering a perfect solution for those needing a quick energy boost.(1 to 14)

AdvantagesofEnergyJelly:

Convenience

1. Easytoconsume:EnergyJellyisachewablesupplementthatdoesn'trequirewater.
2. Portable:It'seasytocarryandconsume on-the-go.

EnergyBoost

1. Quickenergyboost:EnergyJellyprovidesarapidenergyboosttohelp youpowerthrough your day.
2. Sustainedenergy:Thesupplement'suniqueformulationprovidesasustainedenergyboost that lasts for several hours.

HealthBenefits

1. Naturalingredients:EnergyJellyisformulatedwithnaturalingredientslike natural flavoring agent, and glucose.
2. No crashorjitters:Thesupplement'suniqueblendofin

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gredientshelpsavoidenergy crashes and jitters.

Versatility

1. Suitableforvariouslifestyles:EnergyJellyisperfectforstudents,athletes,professionals, and anyone needing an energy boost.
2. Pre-workout,post-workout,oranytime:EnergyJellycanbeconsumedat anytimeto provide an energy boost.

(15-24)

II. INGREDIENTS

2.1 FollowingingredientsareusedintheformulationofEnergyjelly: (24-27)

Sr.No	Ingredients	Quantity
1.	Veg Gelatin	12g
2.	Glucose(Energy)	10g
3.	PotassiumCitrate(AcidityRegulator)	1g
4.	Sugar	400g
5.	NaturalRaspberryFlavor	80g
6.	Salt	2g
7.	NaturalCherryRedFood	0.5g
8.	MineralWater	0.2g

2.1 FollowingingredientsareusedintheformulationofEnergyjelly

1. Veg-gelatin Introduction

Agar agar is a vegan gelatin substitute derived from red algae. It's a popular ingredient in Asian desserts, vegetariancuisine, and plant-based recipes. Odorless and flavorless, agar agar is rich in fiber, vitamins, and minerals, making it a nutritious and versatile addition to various dishes.

- **Synonyms**
  - Redalgaegel
  - Agarpowder
  - Japanesegelatin
- **Family**
  - Gelidiaceae
- **BiologicalSources**
  - Redalgae(Rhodophyta)
- **ChemicalConstituents**
  - C14H24O9
- **Properties**
  - Gel-liketexture
  - Odorlessandtasteless
  - Non-toxicandnon-reactive

2. Glucose Introduction

Glucose is a simple sugar and primary source of energy for cells. Also known as dextrose or blood sugar, glucose is a vital component of many carbohydrates and plays a crucial role in cellular metabolism, influencing various bodily functions and overall health.

- **Synonyms**
  - Dextrose
  - Bloodsugar
  - Simplesugar
- **Family**
  - Monosaccharides
- **BiologicalSources**
  - Fruits,grains,vegetables
- **ChemicalConstituents**
  - C6H12O6
- **Properties**
  - Energysource
  - Hygroscopic

3. Potassiumcitrate Introduction

Potassium citrate is a versatile acidity regulator, controlling pH levels in foods, beverages, andpharmaceuticals, while also providing essential potassium ions and supporting overall health.

- **Family**
  - Citratesalts
- **BiologicalSources**
  - Oranges, lemons
- **ChemicalConstituents**
  - C6H5KO7
- **Properties**
  - Acidityregulator
  - Whitecrystallinepowder

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- Non-toxicandnon-reactive

4. Sugar Introduction

Sugar is a naturally occurring sweetener extracted from sugarcane or sugar beets. Composed of sucrose molecules, sugar serves as a primary energy source for cells. It's widely used in food, beverages,andpharmaceuticals,andisanessentialingredientinmanyrecipesandindustries.

➢ **Synonyms**
- Sucrose
- Whitesugar

➢ **Family**
- Carbohydrates

➢ **BiologicalSources**
- Sugarcane

➢ **ChemicalConstituents**
- C12H22O11

➢ **Properties**
- Whitecrystalline solid
- Sweettaste
- Non-toxicandnon-reactive

5. Naturalraspberryflavor Introduction

Natural raspberry flavor is a sweet-tart and aromatic flavoring derived from raspberries. It's commonlyused in food, beverages, aromatherapy, and perfumeryto add a sweet and fruitytaste and pleasant aroma.

➢ **Synonyms**
- Raspberryextract
- Raspberryessence

➢ **Family**
- Fruitflavors

➢ **BiologicalSources**
- Raspberry

6. Salt Introduction

➢ **ChemicalConstituents**
- C10H12O2

➢ **Properties**
- Fruityand floralaroma
- Sweet-tartflavor

Salt is a crystalline mineral composed of sodium chloride (NaCl),essential for human health, and a fundamental seasoning in cooking, enhancing flavors and textures.

➢ **Synonyms**
- Sodiumchloride
- Tablesalt

➢ **Family**
- Minerals

➢ **BiologicalSources**
- Seawater

➢ **ChemicalConstituents**
- NaCl

➢ **Properties**
- Crystallinestructure
- Whitecolor

7. Naturalcherryredfoodcolor Introduction

NaturalCherryRed FoodColorisavibrant, non-syntheticcolourant derived fromplants, suchas cherries, beets, or tomatoes. It adds a deep red hue to food products, enhancing their visual appeal.

➢ **Synonyms**
- RedBeetColor

➢ **Family**
- Foodcolor

➢ **BiologicalSources**
- Cherries

➢ **Properties**
- Coloringagent

III. FORMULATION

BatchDetails

Forapproximately500gmofEnergy jelly

1. VegetableGelatin(Agar-Agar)-12g
Gellingagentforquicksettingatroomtemperature.

2. Glucon-D(GlucosePowder)-10g Provides instant energy.
3. Potassium Citrate (Acid Regulator) - 1 g RegulatespHandenhancesflavorstability.
4. MineralWater-400 mL

Baseliquid forhydrationanddissolution.

5. Sugar-80g
Sweetensandaidsingellingspeed.

6. NaturalRaspberryFlavor -2mL(or0.5tsp) Adds

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fruity taste.

7. Salt-0.5g

Balancessweetnessandenhancesflavor.

8. NaturalCherryRed FoodColor -2-3drops Provides appealing red color.

IV. METHODOFPREPARATIONOFENERGYJELLY

Equipment:

- Measuringscaleandspoons
- Heat-resistantmixingbowl
- Saucepanorheating source
- Stirringspoonor whisk
- Handheldmixer(optional, forenhanced foaming)
- Moldsforsettingthejelly

V. PREPARATION:

DissolveAgar-Agar:

- Pour 400mLofmineralwaterintoasaucepanandheatitto85-90°C.
- Gradually add 12 g of agar-agar to the warm water, sprinkling it in while stirring continuously with a spoon or whisk. Stir for 5-7 minutes until the agar-agar is completely dissolved and the mixture becomes slightly viscous.

SugarandSalt:

- Add 80 g of sugar and 0.5 g of salt to the agar-agar solution. Stir over medium heat for 2-3 minutes until fully dissolved.

AddEnergy and pH Components:

- Reducethe heat to low (50-60°C) to avoid degrading the glucose. Add 10 g of Glucon-D and 1 g of potassium citrate. Stir gently for 1-2 minutes until evenly mixed.

MixinFlavourandColour:

- RemovethesaucepanfromtheheatStirin2mLofnaturalraspberryFlavourand 0.2 g of natural cherry red foodcolour. Mix thoroughly for 1 minute to ensureuniform flavour and colour distribution.

CreateFoamyTexture:

- While the mixture is still warm (around 40-50°C), whisk it vigorously with a spoon or whisk for 1-2 minutes to incorporate air and create a foamy texture.

PourintoMolds:

- Immediately pour the foamy mixture into clean, dry molds to preserve the airy texture.

SetatRoomTemperature:

- Allow the jelly to set at roomtemperature (25°C) for 1-2 hours. The agar-agar will solidify the mixture into a firm yet soft.

FinalProduct:

- After 1-2 hours, the energy jelly will be fully set. It should have a vibrant cherryred colour, a foamyand slightlyairytexture, and a sweet raspberryflavour with an energy boost from Glucon-D.

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VI. RESULTS:

6.1 QUANTITYOFINGREDIENTS

Nameofingredients	Quantity(%)	Role
VegetableGelatin (Agar-Agar)	12 g(2.4%)	Gellingagentforstructure
Glucon-D (GlucosePowder)	10 g(2.0%)	Instantenergysource
PotassiumCitrate	1g(0.2%)	Acid regulator,pH stabilizer
MineralWater	400g(80.0%)	Baseliquidfordissolution
Sugar	80 g(16.0%)	Sweetenerandgellingaid
NaturalRaspberry Flavour	2 g(0.4%)	Flavourenhancement
Salt	0.5g (0.1%)	Flavourbalancer
NaturalCherryRedFood Colour	0.2g (0.04%)	Visualappeal

TABLE 6.1 QUANTITYOFINGREDIENTS

6.2 PRIMARY EVALUATION PARAMETERS

Parameter	InitialState
Colour	Cherryred
Shape&Firmness	Firm,holdsmold
Texture	Soft& airy
Taste	Sweet,tangy,strong raspberry
pH	3.5- 4.5
EnergyContent	360 kcal/500g
SettingTime	2 hoursat25°C
Syneresis(WaterRelease)	None

6.2 EVALUATION PARAMETERS

6.3 SECONDRY EVALUATION PARAMETERS:

SrNo.	EvaluationParameter	Observation
1.	Texture	Smooth & Gel-like
2.	Color	Cherryred
3.	Clarity	Clear
4.	Taste	Fruity&Sweet
5.	Aroma	Mild
6.	Mouthfeel	Refreshing
7.	Energyboost	Noticeable
8.	Hydration	Fluidbalance

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9.	Endurance	Improve Endurance
10.	Calories	20-30perserving
11.	Carbohydrates	4-6gperserving

6.3 SECONDRY EVALUATION PARAMETERS

FIGURE 1: FINAL FORMULATED PRODUCT

VII. CONCLUSION

In conclusion, the energy jelly offers a unique and convenient way to boost energy levels. With its carefully selected blend of ingredients, including glucose, sugar, and gelatin, this product provides a natural and sustained energy boost.

The energy jelly's smooth and gel-like texture, combined with its pleasant flavor, makes it an enjoyable and easy-to-consume product.

Overall, the energy jelly product is an excellent choice for individuals seeking a natural energy boost to power through their busy lives. Its unique blend of ingredients and great taste make it a standout product in the energy supplement market. Whether you're an athlete, student, or simply looking for a pick-me-up, the energy jelly is definitely worth considering.

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