



Research Article

Formulation And Evaluation Of Muscle Relaxant Bath Bombs Contains Neem Oil

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ABSTRACT

This study focuses on creating and assessing herbal bath bombs to utilize their medicinal and cosmetic benefits for skin cleansing, detoxification, and moisturizing. Bath bombs, which contain citric acid and sodium bicarbonate, react with water to produce a fizzy effervescence, releasing carbon dioxide and aromatic scents. The research includes ingredients like neem oil, turmeric, rose oil, and Epsom salts to enhance therapeutic effects. The methodology involves preparing bath bombs and evaluating their physical appearance, effervescence time, skin compatibility, pH levels, stability, and antimicrobial properties. Results show that formulation "B" excels in stability, pH balance, effervescence duration, and lack of skin irritation. The study concludes that herbal bath bombs, with their skin-nourishing and aromatherapy benefits, offer significant advantages for mental and physical well-being. It also suggests potential future improvements in their formulation to address various skin types and needs.

INTRODUCTION

What is a Bath Bomb?

Bath bombs, also known as effervescent bath pills, are products designed to add colour, fragrance, and fizz to a bath. Recently, they have surged in popularity, with numerous variations available in retail and online stores. The chemistry of bath bombs is relatively straightforward, involving an acid-base reaction between citric acid and sodium bicarbonate. (1). This combination, when dry,

remains inactive, but upon contact with water, it reacts to produce carbon dioxide, salt, and water. For example, sodium bicarbonate and citric acid react in the presence of water to create this effervescent effect (2). In today's fast-paced world, achieving a relaxed state of mind and body can be challenging. Bath bombs offer an affordable means to support both mental and physical health. Through the use of moulds and dyes, herbal therapeutic bath bombs can be customized in

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various shapes, sizes, and festive colors, adding a playful and enjoyable element to bath time(3).

Objective of the Study

The objective of this study is to design bath bombs that capitalize on their medicinal and cosmetic properties, such as body cleansing, detoxification, and moisturizing. This involves assessing the safety and stability of these formulations, including pH levels and antimicrobial activity, to ensure they meet quality standards suitable for consumer use (3).

Reaction



This reaction produces sodium citrate, water, and carbon dioxide. The carbon dioxide generates bubbles in the water, and the formulation's scent is released. A surfactant foaming agent creates additional foam, enhancing the bathing experience. Because the ingredients are diluted in water, sodium bicarbonate and citric acid do not cause skin irritation (2).

Cosmetic Chemistry

Educators continuously seek innovative ways to connect chemistry to real-world applications, often

through food, medicine, and increasingly, cosmetics. The cosmetic chemistry industry, valued at over \$100 billion, produces a range of products from shampoos to perfumes. Despite its everyday relevance, there are limited teaching experiments related to cosmetic chemistry in general courses. Notable educational activities include making cold cream, lotion, and soap, and exploring the acid-base properties of bath bombs. This study provides an experiment where students can create and analyse bath bombs, integrating fundamental principles of kinetics and cosmetic chemistry (1).

Introduction to Skin

The acidity of the skin's surface was first discovered by Heuss in 1892. Subsequent potentiometric measurements have shown that the skin's pH ranges from 4.2 to 5.6. The use of glass electrodes for skin pH readings has become common since the early 1950s. Various factors influence skin pH, including endogenous factors like age and sebum, and exogenous factors such as detergents and cosmetic products (4).

Table No. 01. Factors influencing skin pH

Endogenous factors	Exogenous factors
Age	Detergents, cosmetic products, soaps
Anatomic site	Occlusive dressings
Genetic predisposition	Skin irritants
Ethnic differences	Topical antibacterial
Sebum	-
Skin moisture	-
Sweat	-

MATERIALS AND METHODS

Sodium Bicarbonate (Baking Soda)

Sodium bicarbonate offers several skin benefits, such as exfoliation and pore tightening. It helps

remove dead skin cells, leaving the skin smooth and glowing. Additionally, it neutralizes body odors, making it an ideal ingredient for fragrant bath bombs (5).



Fig No.1- Baking Soda

Corn Starch

Corn starch synergistically enhances the effects of other bath bomb ingredients like baking soda,

prolonging the effervescence. This results in a longer-lasting fizz, adding to the overall bathing experience (5).



Fig No.2- Corn Starch.

Magnesium Sulphate (Epsom salts)

Epsom salts, composed of magnesium and sulphate ions, are easily absorbed through the skin. They play critical roles in, inflammation reduction,

muscle relaxation, and preventing arterial hardening. Sulphate in Epsom salts also help treat headaches (6).



Fig No.3. Magnesium sulphate

Neem (Azadirachta indica)

Neem oil, from the Meliciaceae family, is used to treat various skin issues, including wrinkles and

erythema. Its antibacterial and moisturizing properties make it a common ingredient in external cosmetic applications (7).



Fig No.4- Neem

Rose Oil

Rose oil (*Rosa damascena* Mill, Rosaceae) is valued in medicine for its therapeutic properties, particularly in aromatherapy. It alleviates emotional distress, anxiety, tension, and stress-related insomnia. Rose oil also exhibits antimicrobial properties (8).



Fig No.5- Rose oil

Turmeric

Turmeric, derived from the rhizome of a ginger-like plant, contains curcumin and volatile oils with strong anti-inflammatory properties. Both in vivo and in vitro studies have demonstrated turmeric's ability to inhibit the activity of various carcinogens and mutagens. It also inhibits the growth of numerous bacteria, parasites, and fungi (9).



Fig No.6- Turmeric

Citric Acid

Citric acid, found in citrus fruits, is a tricarboxylic acid with a molecular weight of 210.14 g/mol. It is safe, affordable, biodegradable, and used for its sequestering, buffering, wetting, cleaning, and dispersing properties. Citric acid is essential in producing effervescent salts, confections, soft drinks, and medicinal citrates (10).



Fig No. 7 Citric Acid

EXPERIMENT AND RESULTS

Formulation Table

Table no. 02. Formulation table of bath bombs

Sr. no.	Ingredients	Quantity	Uses / Activity
01	Sodium bicarbonate (baking soda)	24.6gm	Weak base
02	Magnesium sulphate	6.2gm	Muscle relaxant
03	Citric acid	6.1gm	Strong acid
04	Corn starch	12gm	Binders
05	Neem oil	4ml	Antibacterial, antioxidant, antiaging, other
06	Turmeric	q.s.	Antiseptic, anti-inflammatory, Colorant
07	Rose oil	2ml	Fragrance, antimicrobial
08	Perfumes	q.s.	For fragrance

Reaction

Citric Acid + Sodium Bicarbonate + Water = Salt + Water + CO₂

METHODOLOGY

Preparation of Bath Bomb

A. Step One

1. Weigh all dry ingredients.

2. Add them to a dish and stir.

B. Step Two

1. In a beaker, mix turmeric with rose oil.
2. Add rose water to the turmeric solution.
3. Slowly mix the liquid into the dry ingredients until slightly moist. Avoid adding too much water to prevent premature neutralization.



Press the mixture into moulds and freeze for **Physical Appearance**

30 to 45 minutes (11).

4. **Evaluation Tests**

Physical appearance was assessed for three formulations (A, B, C) (7).

Table No.3: Physical Appearance Test

Sr. No.	Evaluation	Formulation		
		A	B	C
1.	Colour	Yellowish	Yellowish	Colour change
2.	Oduor	Characteristic	Characteristic	Characteristic
3.	Texture	Rough	Smooth	Smooth



Fig no.8. Physical appearance of Bath Bomb

Effervescent Time

The effervescence time was measured by placing a bath bomb in 500 ml of room temperature distilled water until bubbling ceased (7).

Table No.4: Effervescent Time

Sr. No.	Formulation	Effervescent time		
		At room temp.	At 50°C	At 100°C
1.	A	0.15sec	0.10sec	0.08sec
2.	B	0.06sec	0.04sec	0.02sec
3.	C	0.09sec	0.03sec	0.05sec

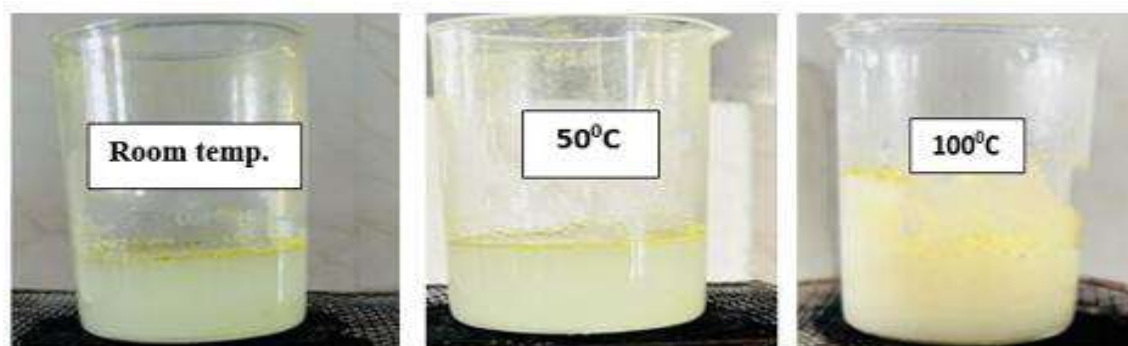


Fig no. 9. Effervescent time

Skin Patch Test

The bath bomb was dissolved in a tub of water, and the test was considered successful if no irritation occurred after five minutes (7).

Table No.5: Skin Patch Test

Sr.no.	Formulation	Skin patch test
1.	A	No irritation
2.	B	No irritation
3.	C	No irritation

pH Test

The pH of the solution containing the bath bomb was measured (7).

Table No.6: pH Test

Sr.no.	Formulation	pH
1.	A	7.2 ± 1.2
2.	B	7.0 ± 2.7
3.	C	7.4 ± 1.8



Fig. no. 10. pH test

Stability Testing

Samples were stored at room temperature for two weeks, and any changes were noted (7).

Table No.7: Stability Testing

Sr.no.	Formulation	Stability testing
1.	A, B, C	No deformation occurs

Antimicrobial Activity

Nutrient agar was prepared aseptically, and Staphylococcus aureus was used to test microbial growth. Three testing methods were employed

Negative control testing:

Nutrient agar was weighed, dissolved in distilled water, and placed into a petri dish.

Positive control testing:

Positive control testing involved weighing and dissolving nutrient agar in distilled water, then

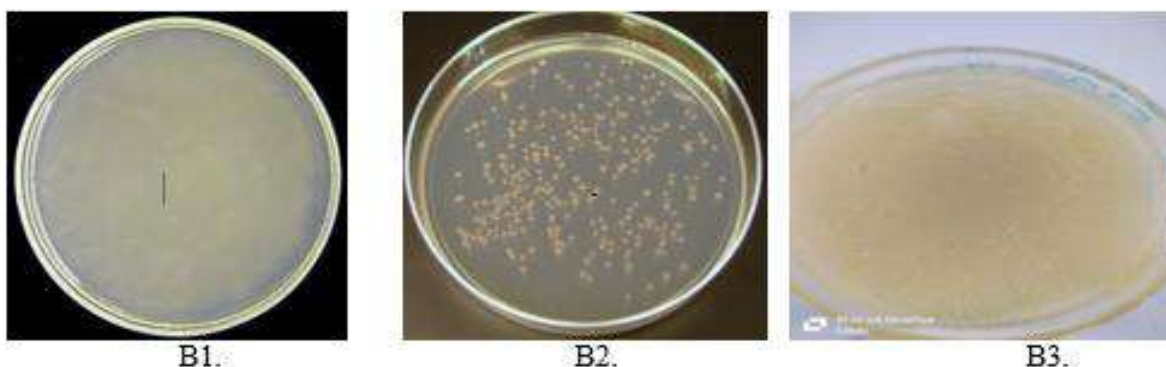
adding bacteria to the medium and pouring it into a petri dish.

Testing with bath bombs:

Nutrient agar was weighed and dissolved in distilled water before adding bath bombs formulation to the medium and pouring it into a petri plate. These methods were used to assess microbial growth with Staphylococcus aureus as the bacteria and nutrient agar as the culture medium (12, 13)

Table No. 8: Anti-microbial activity

Sr. No.	Methods	Result		
		A	B	C
1.	Negative Control Testing (Nutrient Agar)	No growth	No growth	No growth
2.	Positive Control Testing (Nutrient agar+ Bacteria)	Growth occurs	Growth occurs	Medium Growth occurs
3.	With Extract Testing (Nutrient Agar + formulation)	Growth occurs	No growth	No growth

**Fig. no.11. Anti-microbial activity**

A. Nutrition agar, B. Nutrient agar+ bacteria, C. Nutrient agar + formulation

APPLICATION

1. Bath bombs act as skin emollients and softeners, hydrating and pampering the skin.
2. Natural and vegan-friendly, bath bombs avoid harsh chemicals and irritants.
3. The citric acid and sodium bicarbonate in bath bombs provide a cleansing, deodorizing, and skin-repairing effect.
4. The fragrances in bath bombs offer aromatherapy benefits, enhancing mood and relieving stress.
5. Bath bombs create a luxurious and enjoyable bathing experience with their effervescence and pleasant aromas (7).

Storage Conditions

- Store in a cool, dry place.
- Avoid direct sunlight and contact with water.

MERITS

- Enhances relaxation.
- Moisturizes and hydrates the skin.
- Cleanses and repairs skin.
- Helps with muscle pain.

- Improves sleep quality.

DEMERITS

- May cause irritation or dryness in some cases.
- Artificial colours can cause irritation.
- Excessive use can alter skin pH.

FUTURE ASPECTS

- Innovation in formulations to enhance skincare benefits for aging, acne, and sensitive skin.
- Increased global adoption as more people become aware of the benefits.
- Customization for different skin types and mood enhancement.

CONCLUSION

From this we can conclude that the components and benefits of herbal bath bombs for skin health by their formulation and evaluation. Due to its muscle relaxant properties, skin benefits, and aroma therapy. Bath bombs contains oil such as coconut oil, neem oil, rose oil which are used to hydrate our skin, moisturize our skin. So we can use bath bombs at regular interval of time to fill

better or more excited. We have three formulations: A, B, and C. upon comparing all three, formulation "B" is better than the other two. "B" has good stability and pH, a better effervescent time than the others, and it does not cause any skin irritation.

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