

Formulation and Evaluation of Anti-Inflammatory Bath Bomb Containing Pala Indigo Oil

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ABSTRACT

Bath bombs are single-use formulations composed of soothing, fragrant extracts and oils designed for an enhanced bathing experience. This study focuses on the formulation and evaluation of an herbal-based bath bomb, eliminating the use of parabens, artificial dyes, and gluten, which are known to cause skin irritation. Instead, natural ingredients such as citric acid, baking soda, and Epsom salt were incorporated to improve skin hydration, detoxification, and relaxation. The formulated bath bomb was evaluated for various parameters, including organoleptic properties, stability, effervescence time, and pH balance. Additionally, anti-bacterial and anti-inflammatory activities were evaluated using agar well diffusion and the chorioallantoic membrane (CAM) assay. Results demonstrated that the bath bomb exhibited desirable physical characteristics, an acceptable pH range, prolonged effervescence and significant antimicrobial and anti-inflammatory effects.

A key component of this formulation, Pala Indigo Oil, exhibits potent anti-inflammatory and antimicrobial properties, making it particularly beneficial for individuals suffering from skin conditions such as dermatitis. By reducing redness, swelling, and irritation, this herbal bath bomb serves as a soothing therapy for inflamed and sensitive skin, offering a natural alternative to conventional skincare treatments.

KEYWORDS: Bath bomb, Citric acid, Baking soda, Epsom salt, Aromatherapy

I. INTRODUCTION

Cosmetics are any article intended to be rubbed, poured, sprinkled, or sprayed on, or introduced into otherwise applied to, the human body or any part thereof for cleaning, beautifying, promoting attractiveness, or altering the appearance. These are used to protect the skin against exogenous and endogenous harmful agents

and improve the beauty and attractiveness of skin. They are not only developing an attractive external appearance, but towards achieving long life of good health by reducing skin disorders. These products are the best choice to reduce the skin disorders such as skin aging, skin wrinkles, hyperpigmentation and rough skin texture etc.

Bath bombs are single use, blends of smoothing, fragrant extract and oils that can toss in your tub before bath time. It is a hard packed mixture of wet and dry ingredients moulded into several shapes and dried. The primary element of a bath bomb are weak acid and strong base, which is non-reactive under dry condition but when it is in contact with water, it reacts vigorously and forms salt, water and carbon dioxide. Baking soda acts as a fizzing volcano that the other ingredients in bath bomb include Epsom salt, corn starch, essential oils and fragrant. The Epsom salt acts as a muscle relaxant and helps to remove toxins and harmful substances from the body. The corn starch works as a dry filler. Over many centuries, essential oils have been used to reduce anxiety, soothe skin irritation. There are many different essential oils that can be used in bath bombs, but some of the most popular include lavender, sandalwood, chamomile, and Eucalyptus. A Pala Indigo oil-infused bath bomb is a unique and luxurious bath experience that offers a range of therapeutic benefits.

TYPES OF BATH BOMBS

- OIL RICH BATH TRUFFLES
- FOAMING BUBBLE BOMBS
- HERBAL BATH BOMBS
- MEDICATED BATH BOMBS

BENEFITS OF BATH BOMBS

- Promotes Relaxation
- Improves Skin Health
- Natural and Gentle
- Detoxification
- Soothing of muscle

- Body soreness
- Strengthen blood vessels
- Battle insomnia
- Enhance sleep

MATERIALS AND METHODS

METHODOLOGY

1. Selection and collection of raw material
2. Preparation of herbal bath bomb
3. Evaluation of herbal bath bomb
4. Identification of best herbal bath bomb
5. Stability studies

HERBAL MATERIALS USED IN THE FORMULATION

1. PALA INDIGO OIL



Figure No. 1

- **Biological source:** It is a flowering plant species in the genus *Wrightia tinctoria*
- **Family:** - Apocyanaceae
- **Geographical source:** India, south Asia, Australia
- **Part used:** - Leaves
- **Active constituents:** - alkaloids, gum, flavonoids, coumarins, triterpenes, proteins, phenols, carbohydrate, steroids

Medicinal properties of pala indigo

- Acne treatment
- Skin soothing
- Antioxidant
- Wound healing

EXCIPIENTS USED IN THE FORMULATION

1. CITRIC ACID



Figure no. 2

Citric acid is a weak, natural acid that's commonly found in citrus fruits like lemons, limes, oranges, tangerines, grapefruits. It is a "colourless, odourless, and tasteless" crystalline compound, which is the main constituent of bath bombs. The citric acid and baking soda in bath bombs neutralize each other and create the fizzing action.

USES

- Promote a brighter and smoother skin
- Acts as a natural astringent
- Useful disinfectant against a variety of bacteria and viruses.

2. SODIUM BICARBONATE



Figure No. 3

One of the two main components of bath bomb is Sodium bicarbonate, also known as baking soda or sodium hydrogen carbonate. It is a mildly alkaline, white powder with a pH of 8.3 and no odor. Which act as a fizzing volcano that produces carbon dioxide bubbles when mixed with citric acid.

USES

- Anti-bacterial
- Mattifies oily skin.
- Fights body odor

3. EPSOM SALT



Figure no. 4

Epsom salt, also known as magnesium sulphate, is a chemical compound made up of magnesium, sulphur, and oxygen. Epsom salt is a natural exfoliant and anti-inflammatory remedy that can be used to treat muscle aches, dry skin and various internal health issue

USES

- For foot care and pain relief.
- Epsom salt is a natural exfoliant
- For anxiety

4. CORN STRACH



Figure no. 5

Corn starch is a white, tasteless, odorless powder. Corn starch act as a stabilizer for bath bomb. The presence corn starch helps to slow down the rate at which the bath bomb dissolves, causing the fizz rate to decelerate

USES

- It is beneficial for acne-prone skin
- Helps to increase blood sugar levels.
- Sooth skin irritation and inflammation.

5. SPIRULINA POWDER



Figure no. 6

Spirulina powder, made from blue-green algae, is a natural dye that gives vibrant green or blue colours. It's commonly used as an eco-friendly alternative to synthetic dyes in food, cosmetics, and fabrics. On top of its colouring benefits, spirulina is great for the skin.

USES

- Rich in Antioxidants
- Promotes Skin Hydration
- Reduces Inflammation

6. POLYSORBATE 80



Figure no. 7

Polysorbate 80 is a synthetic compound derived from polyethoxylated sorbitan and oleic acid. It is a surfactant, emulsifier, and solubilizer often used in foods and cosmetics. Its main function is to help other ingredients dissolve in a solvent in which they normally would not be able to dissolve.

USES

- Emulsifier
- Solubilizer
- Surfactant

7. ALMOND OIL



Figure no.8

Almond oil is a versatile and nutritious oil derived from almonds. Available in two main types—bitter and sweet—the oil is used for a range of purposes, from cooking to skincare.

USES

- Moisturizer:
- Anti-aging
- Dark Circles

8. ROSE WATER



Figure no. 9

Rose water is the fragrant liquid distilled from fresh rose petals. It is a pantry staple throughout the Mediterranean and Middle East, just a dash adds a delicate floral quality to both sweet and savory foods

USES

- Used as perfuming agent.
- Antioxidant.
- Reducing inflammation

HERBAL BATH BOMB FORMULATION

SL NO.	INGREDIENTS	F1	F2	F3
1	Citric acid	16g	16g	16g
2	Sodium bicarbonate	8g	8g	8g
3	Epsom salt	8g	8g	8g
4	Corn starch	8g	8g	8g
5	Pala indigo oil	1.75ml	2ml	2.5ml
6	Spirulina powder	1.25g	1.5g	2g
7	Almond oil	2ml	2ml	2ml
8	Polysorbate 80	1ml	1ml	1ml
9	Rose water	1.5ml	1.5ml	1.5ml

Table no. 1

PREPARATION OF HERAL BATH BOMB

- Weighted all ingredients and sieved the dry ingredients to remove clumps



- Mixed the dry ingredients : in a large mixing bowl , combine baking soda, citric acid,

Epsom salt, and cornstarch. Stir these ingredients together to ensure they are well blended and free of clumps.

- Poured all wet ingredients like Pala indigo oil ,almond oil ,spirulina, polysorbate 80 and rose



water into a separate beaker .and mix the wet ingredients thoroughly.

↓
• Very slowly add the oil mixture into dry ingredients .as pour, continuously stir the mixture to prevent any fizzing reaction.

↓
• Add few drops of water using the spray bottle and whisk again

↓
• Once the mixture is right consistency, Mash the mixture very tightly on both halves of the mold

↓
• Leaves bath bomb in mold to dry for 2-4 hours, after that carefully remove the bath bomb from the mold

↓
• Stored the bath bomb in an airtight container to prevent moisture from activating citric acid before



Figure no. 10

EVALUATION

PREFORMULATION STUDIES

I. Physical appearance: -

Physical evaluation was done by testing the colour, shape and texture of the bath bomb. The bath bomb was found to have pleasant Odor and bath bomb having the colour of green

SL NO.	EVALUATION PARAMETERS	F1	F2	F3
1	Colour	Light green	Light green	Light green
2	Odour	Fragrant	Fragrant	Fragrant

3	Shape	Round	Round	Round
4	Texture	Smooth	Smooth	Smooth

Table no. 2



Figure no. 11

II. pH determination: -

The pH of solution containing bath bombs is measured and results as follows

SL NO.	FORMULATION	pH
1	F1	6.09
2	F2	7.01
3	F3	7.10

Table no. 3



Figure no. 13

3. Effervescent time:-

Prepared formulation of bath bomb has been evaluated for effervescent time the obtained data is as below

SL NO.	FORMULATION	TIME
1	F1	3 min 18sec
2	F2	3 min 30 sec
3	F3	3min 50 sec

Table no. 4

4. Skin irritation test

SL NO.	FORMULATION	RESULT
1	F1	No irritation
2	F2	No irritation
3	F3	No irritation

Table no. 5

All the 3 formulations not cause irritation , This can be advantageous in maintaining hygiene during bathing



Figure no. 12

5. Skin Inflammation test

The bath bomb containing pala indigo oil resulted in a significant reduction in swelling and vascular permeability compared to control, indicating its effectiveness in reducing inflammation

SL N O.	FORMULATION	RESULT
Blank	DMSO	No reaction
Control	0.9% Nacl treated	Inflammation
F6	0.9% Nacl + f6	Reducing inflammation

Table no. 6



Blank(NO REACTION)



Control(INFLAMMATION)



F6 (REDUCE INFLAMMATION)

Figure no. 13

II. RESULT AND DISCUSSION

1. . PHYSICAL EVALUATION.

The appearance, odour and colour of the three formulations F1, F2 and F3 was evaluated and the results are shown in table 2

2. DETERMINATION OF pH

The pH of the bath bomb was found to be in the range of 6.09- 7.10 , which is good for the skin. All the prepared formulation of the bath bomb are nearer to the skin pH, pH of F1 was 6.09, F2 was 7.01 and F3 was 7.01

3. SKIN INFLAMMATION TEST

The absence of irritation indicates that the bath bomb is gentle on the skin, which is a desirable quality for bath products.

III. DISCUSSION

The present study was conducted and evaluated on an herbal bath bomb using Pala indigo oil The bath bomb was evaluated to the physical appearance manually. Formulation F3was selected as the best among the preparation of bath bombs. The formulation has good foamability and inflammation . The pH of the bath bomb was up to the standard values as specified. The bath bomb was non-irritant and did not cause any harm to the skin

IV. CONCLUSION

The research project “Formulation and Evaluation of an Anti-Inflammatory Bath Bomb Containing Pala Indigo Oil” was successfully developed and evaluated. The bath bomb was formulated with natural ingredients such as Pala Indigo oil, spirulina, Epsom salt, almond oil, and rose water, offering therapeutic and skin-nourishing benefits. Spirulina serves as a natural dye while providing antioxidant, anti-inflammatory, and hydrating properties that help detoxify the skin.

The chick embryo model study confirmed the anti-inflammatory effects of Pala Indigo oil, significantly reducing inflammation without toxicity. Antibacterial activity was also evaluated through the zone of inhibition, proving its effectiveness in combating bacteria. Additionally, almond oil and Epsom salt enhanced the bath bomb’s soothing and stress-relief properties.

A total of three formulations with varying concentrations of Pala Indigo oil were developed, with F3 proving to be the most effective based on evaluation parameters.

The study highlights the potential of natural ingredients in self-care products for skin health and overall wellness

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