



Research Article

## Formulation and Evaluation of Antifungal and Muscle Relaxant Herbal Bath Bomb Containing Cinnamon Oil

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### ABSTRACT

Bath bombs are a popular way to prepare a revitalising, soothing, and fragrant bath. It is a solid mixture of a weak acid and a strong base that does not react in dry conditions but strongly reacts with water to form salt, water, and carbon dioxide. The main aim of this research work is to prepare the medicated bath bomb and evaluated for the efficacy. The herb used in the preparations by adding plant leaf extract of cinnamon and turmeric that leaf extract has antifungal activity. Commonly bath bomb is prepared with Citric acid, Sodium Bicarbonate, Corn starch, Epsom salt, various natural colors etc. Due to the reaction of citric acid and sodium bicarbonate in presence of water, CO<sub>2</sub> gas forms and the fragrance present in formulation is evolved with it. The formulated bath bomb are evaluated for the various parameters like Effervescent time, Skin patch test, pH, Flow Property, bulk density, carre's index and microbial study. The results shown that all formulation gave satisfied results.

### INTRODUCTION

Most skincare items are used to the skin for a number of reasons, including protection and aesthetics. Skin care products are nothing new; people have long needed them. The skin's structure and functions are thus crucial considerations when creating cosmetics. Now-a-Days herbal cosmetics are becoming more and more popular as more women choose natural goods over those manufactured of chemicals. Herbal cosmetics provide natural ingredients that increase consumer happiness and have far fewer negative side effects

than synthetic cosmetics. Acne vulgaris may be unsettling, especially for teens and young adults. 85% of the population will be affected by this skin condition, according to figures from throughout the world.

Bath bombs are a common preparation for a revitalising, calming, and scented bath. Although the moniker seems ominous, the formulation is really pretty intriguing. Commonly bath bomb is prepared with Citric acid (C<sub>6</sub>H<sub>8</sub>O<sub>7</sub>), Sodium Bicarbonate (NaHCO<sub>3</sub>), Corn starch, MgSO<sub>4</sub> (Epsom salt), various natural colors etc. Due to the

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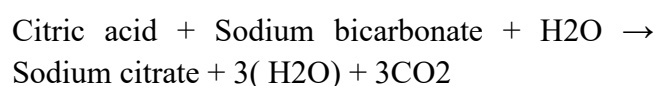


reaction of citric acid (C<sub>6</sub>H<sub>8</sub>O<sub>7</sub>) and sodium bicarbonate (NaHCO<sub>3</sub>) in presence of water, CO<sub>2</sub> gas forms and the fragrance present in formulation is evolved with it. In essence, a bath bomb is a mixture created for a pleasant, calming bath. It's a fresh idea to incorporate therapeutic effects like antibacterial and antifungal activity in bath bombs. Cinnamon oil is added to the recipe to offer it antifungal and antibacterial properties, MgSO<sub>4</sub> (Epsom salt) relaxes the muscles. Numerous studies demonstrate that cinnamon extract has antifungal properties. The main component of the extract that has a fatal impact on *Candida albicans* is cinnam aldehyde. Bath bombs made with ethanolic extract will be effective for treating fungal infections on the skin. The patient can take advantage of an antimicrobial, aromatic, and soothing bath. The preparation of turmeric also has antibacterial properties. Bath bombs combine therapeutic activities with pleasure and relaxation.

**Bath bomb:** It is a solid preparation of a weak acid and a strong base that does not react under dry conditions but when it comes into contact with water it reacts strongly to form salt, water and carbon dioxide.

E.g., citric acid is reacted with sodium bicarbonate in presence of water.

**Reaction:**



In above reaction Citric and Sodium Bicarbonate react in presence of water to give sodium salt of Citric acid, water and Carbon Dioxide. Due to the evolution of Carbon Dioxide, bubbles will form in the water, with the bubbles, fragrance present in formulation also evolves and introduction of foaming agent of surfactant forms foam with bubbles. Citric and Sodium bicarbonate do not irritate the skin due to sufficient dilution in water.

**Medicated Bath Bomb:** A medicinal bath bomb is made by adding plant leaf extract to the bath bomb ingredients several studies have shown that betel leaf extract has antifungal activity.

**Methodology**

**PREPARATION OF BATH BOMB:**

A)

1. Weigh all dry ingredients
2. Add them to dish with stirring

B)

1. Take water in beaker and add turmeric in it with stirring
  2. Add rose water in water containing beaker
- Mix liquid in B to A slowly to make it slightly moist; do not add too much quantity of water what will accelerates the neutralizing reaction. Make the mixture slightly moist only. Add the prepared mixture to mold with desired shape and freeze it for 30 to 45 min. Remove the bath bomb carefully from the mold.

**Formulation Table. 1**

| Sr.no | Ingredients        | Quantity | Role                |
|-------|--------------------|----------|---------------------|
| 1.    | Sodium bicarbonate | 24.6gm   | Weak base           |
| 2.    | Citric acid        | 6.1gm    | Strong acid         |
| 3.    | Corn starch        | 12gm     | Binder              |
| 4.    | Magnesium sulphate | 6.2gm    | Muscle relaxant     |
| 5.    | Cinnamon oil       | 6.2gm    | Antifungal          |
| 6.    | Turmeric           | Qs.      | Colorant/antiseptic |

**EVALUATION TEST:**

**Effervescent time:** A single bath bomb is placed in a tub containing 20 lit of water at 20 °C+1 °C.



Whenever a clear solution without particles is obtained effervescence time has finished. The mean of three measurements of each formulation is to be reported.

**Skin patch test:** Dissolve the bath bomb in water full of tub. Place hand for 5 min, it irritation is not there then test find to be pass.

**pH test:** pH of solution containing bath bomb is measured.

**Flow Property:** Angle of repose ( $\theta$ ): Angle of repose is defined as the maximum angle possible between the surface of a pile of the powder and horizontal plane.

$$\tan \theta = H/R \quad \theta = \tan^{-1} (H/R)$$

Where,

$\theta$  is the angle of repose.

H is height of pile.

R is radius of the base of pile

**Flow Rate:** Flow rate of a powder has been defined as the rate at which the particular mass emerges through the orifice of funnel of a suitable diameter.

Flow rate = weight of granule/ time in seconds

**Bulk Density:** The bulk density was obtained by dividing the mass of a powder by the bulk volume in cm<sup>3</sup>

$$D_f = M_p/V_p$$

Where,

$D_f$  = bulk density.

M = weight of samples in grams.

$V_p$  = find volumes of granules in cm<sup>3</sup>

**Tapped density:** The tapped density was obtained by dividing the mass of a powder by the tapped volume in cm<sup>3</sup>

$$D_o = M/V_p$$

Where,

$D_o$  = bulk density

M = weight of sample in grams.

$V_p$  = final volumes of granules in cm<sup>3</sup>.

**Carr's Index:** An indirect method of measuring powder flow from bulk densities was developed by Carr. The percentage compressibility of a powder was a direct measure of the potential powder arch or bridge strength and stability. Carr's index of each formulation was calculated according to equation given below:

$$\% \text{ Compressibility} = \frac{D_f - D_o}{D_f} \times 100$$

Where,

$D_f$  = Fluff or Poured bulk or bulk density.

$D_o$  = Tapped or Consolidated bulk density

**Hausner ratio:** It may be defined as tapped density upon bulk density.

Hausners ratio = Tapped density/Bulk density

**Zone of inhibition study:**

Method: Cup-plate diffusion method is used to study of zone of inhibition using cinnamon oil and compare against amoxicillin solution in nutrient agar media. Determination of zone of inhibition was done by preparing agar plate. Staphylococcus aureus, Escherichia coli is inoculated in agar media. Agar was poured in petri plates aseptically. Plates were allowed to cool and then 5 wells of 10 mm were prepared by sterile cork borer. The concentrations of dissolved formulation were added using micropipette into the well of inoculated plates and were allowed to stand for 10-15 min for diffusion of extract and incubated at 37°C for 48 hr. After incubation period. Plates were examined for clear zone presence surrounding the wells containing the extract. Vernier caliper used for measuring zone of inhibition.

## RESULT

### 1. Flow Property:

#### Angle of repose:

| Sr. No | Name of Powder     | Height in cm | Radius in cm | Angle of repose in degree ( $^{\circ}$ ) | Flow property |
|--------|--------------------|--------------|--------------|--|---------------|
| 1.     | Sodium Bicarbonate | 2            | 3            | 33.69                                    | Good          |
| 2.     | Citric acid        | 2            | 2.7          | 36.52                                    | Fair          |
| 3.     | Magnesium sulphate | 2            | 2.1          | 43.60                                    | Passable      |



|    |                      |      |     |       |      |
|----|----------------------|------|-----|-------|------|
| 4. | Corn Starch          | 23.1 | 3.1 | 32.82 | Good |
| 5. | Mix. of above powder | 2    | 3.3 | 31.21 | Good |

**Bulk density, Tapped density:**

| Sr. No | Name of Powder Weigh gm  | Bulk volume in ml | Tapped volume in ml | Bulk density (gm/ml) | Tapped density (gm/ml) |
|--------|--------------------------|-------------------|---------------------|----------------------|------------------------|
| 1.     | Sodium bicarbonate       | 50.2              | 45                  | 0.49                 | 0.54                   |
| 2.     | Citric acid              | 18                | 15                  | 0.33                 | 0.40                   |
| 3.     | Magnesium Sulphate       | 30                | 25                  | 0.40                 | 0.48                   |
| 4.     | Corn Starch              | 18                | 14                  | 0.34                 | 0.44                   |
| 5.     | Mix. of all above powder | 102.8             | 91                  | 0.47                 | 0.53                   |

**Hausner ratio, Carr's index:**

| Sr. No | Name of powder           | Hausner ratio | Carr's index (%) | Flow property |
|--------|--------------------------|---------------|------------------|---------------|
| 1.     | Sodium bicarbonate       | 1.10          | 10.2             | Good          |
| 2.     | Citric acid              | 1.20          | 21.0             | Passable      |
| 3.     | Magnesium Sulphate       | 1.20          | 20.0             | Fair          |
| 4.     | Corn Starch              | 1.29          | 29.0             | Passable      |
| 5.     | Mix. of all above powder | 1.12          | 12.0             | Good          |

**Effervescent time, pH:**

| Sr. No. | Formulation | Effervescent time | pH  |
|---------|-------------|-------------------|-----|
| 1.      | A           | 5.35min           | 7.5 |
| 2.      | B           | 5.40min           | 8.1 |
| 3.      | C           | 5.50min           | 8.5 |
| 4.      | Mean        | 5.41min           | 8.3 |

**Skin patch test:**

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

**Zone of inhibition study:**

| Sr. No. | Formulation       | Diameter of zone of inhibition |
|---------|-------------------|--------------------------------|
| 1.      | Amoxicillin (std) | 15mm                           |
| 2.      | A                 | 7mm                            |
| 3.      | B                 | 10mm                           |
| 4.      | C                 | 12mm                           |

**CONCLUSION**

Bath bomb (Cinnamon oil ) possess good antimicrobial as well as antifungal activity and can be used in health benefits as they inhibit the growth against bacteria and fungi .study of zone of inhibition against gram [positive bacteria S.aureus

and gram negative bacteria E.coli show beneficiary result as both the species gain the zone of inhibition against different concentration as discussed in results .it was observe that the zone of inhibition produce by preparation against S.aureus were significantly higher than the corresponding



inhibition zone produce by E.coli. bath bomb preparation provides relaxing bath with therapeutic activity.

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