EPH- International Journal of Applied Science

ISSN (Online): 2454-2016

Volume 11 Issue 01-March, 2025

DOI: 10.53555/eijas.v11i1.184

FORMULATION, DEVELOPMENT AND EVALUATION TESTING OF FOAMING BATH SALT SUBSUMING HIMALAYAN PINK SALT

Janhavi Suryavanshi[1*], Yash Jagtap[2]

[1]Perfumery Trainee and Lab Assistant, Arochem PVT. LTD, Ratlam, Madhya Pradesh*

[2]Assistant Professor, School of Design, Department of Beauty Cosmetology, Sandip University, Nashik, Maharashtra

***Corresponding Author:** **janhavi260303@gmail.com**

Abstract: *This research discusses the formulation and manufacturing of the recently used most popular bath preparation which is bath salt. Centuries ago, people used different salts to soften hard water. During older times, salts were often used for their healing properties. Salts were also quite common in general medicines for treatment of variety of health conditions which includes skin rashes, inflammation, redness, sore muscles, arthritis etc. The concept of bath salts was first raised when the demand of hot spring bath increased rapidly. People used to visit hot spring bath house to soak their body in lukewarm mineral water to relax and calm their body, to cure any clinical conditions and to interact with people for basic communication. The hot spring water is mineral water and holds carbonates and bicarbonates of different minerals. These salts are readily soluble in water and are beneficial for relaxation and curing different conditions. Some people also started using lava stone also known as volcanic stone for many therapies as it is known for its healing properties, relaxation properties and it does have strength to flush out any negative vibes from the body and mind. By researching and combining all the information together, the concept of bath salts has been raised.*

This research initially defines the term "BATH SALTS." Further followed by describing about its purpose of use and its types. Bath salts are used for several purposes such as cleansing, foaming, relaxation, therapeutic treatment and for aesthetic appeal. It helps in healing dermal as well as other clinical conditions. Next it contains the hit and trial method and formula for preparation of bath salts. The main ingredients of the formulated bath salts are Himalayan pink salt, Epsom salt, sodium bicarbonate, some mild surfactants, color, and perfume. All the three salts help to reduce the surface tension of water and helps to cure many skin problems. Finally, it deals with the claims and testing of the same.

Keywords: *Bath salts | History | Hot Spring bath house | Volcanic rock | Uses | Internal and Dermal conditions*

Introduction:

Bath salts are water-soluble, salts that are added to water to be used for bathing. They are said to improve cleansing, enhance the experience of bathing, and gives an aesthetic feel. Bath salts convert hard water into soft water i.e., it reduces the hardness of water and helps other liquid soap to dissolve in the water. Some bath salts have glycerin so that it will function as a humectant.

Fig. 1: Final Product (Self)

Fragrances and colors are often added to bath salts; the fragrances are used to increase the user's enjoyment of the bathing experience. Some bath salts contain surfactants to increase the foaming properties and cleansing properties. Not only for the user's enjoyment or aesthetic appearance, but bath salts are also used to treat dermal and internal skin conditions like erythema, arthritis, inflammation, and sore muscles. Different salts are used from ancestral period for the same purpose but are in trend termed as bath salts.

Purpose to use: Bath salts are used to reduce the hardness of water by reducing the surface tension of water. But it can also play various other functions depending upon the additives.

1. **Cleansing purpose:** It acts as a cleanser by the addition of surfactants. Surfactants also help to reduce the surface tension of water and enhances foaming which gives cleansing property to the bath salt.
2. **Foaming purpose:** In some cases, addition of bath salt to water also leads to foaming, effervescence and bubbles formation as some bath salts contains foaming agents (such as sodium bicarbonate etc.) and surfactants which works together hand in hand.
3. **Softening purpose:** Bath salts are also known as bath soaks or foot soaks as they serve skin softening function, they are used in many manicure and pedicure procedures as feet soaks or hand soak salts. During manicure it is particularly important to make sure that the first step before starting the manicure is hand soaking to soften the skin of hand and cuticles so that the cuticle can be easily removed or pushed backward without any irritation in the further process. Bath salts are widely used as foot soaks. It serves the same function as hand soak as it softens the dry, harden, and rough skin of feet and heels. Foot soaks are used before the process of pedicure to soften the skin and for further steps to be done easily.
4. **Aesthetic purpose:** Countries other than India and many hotels and hot spring bath house in India uses bath salts in their bathtubs, jacuzzi tubs, pools etc. to improve the aesthetic appearance to the pool water and enhances the bathing experience of users. Bath salts adds color or different shades of color and a very mild and calming fragrance to the water. Some of the formulas contains dried petals of different flowers such as rose or hibiscus to make it look more aesthetic and relaxing.
5. **Relaxation purpose:** Bathing in bath salts dissolved in water helps to relax and calm the body as well as mind. Bath salts contains many ingredients like sodium bicarbonate and other salts which helps to reduce tension and fatigue. Salts also helps to relax muscles and blood vessels and improves their functions for better performance of body. The pleasant fragrances added to the bath salts when get dissolved into the water relaxes the mind and reduces stress and anxiety from one's mind and watching beautiful colors getting diffused in water acts as stress reliever.
6. **Therapeutic purpose:** During older times, salts were added to water to reduce the hardness of water. Not only to reduce the hardness of water, but for the treatment of various skin and muscular disorders, these salts were used. Because of lack of scientific knowledge, people used to believe in home remedies and mostly trusts them to be more helpful instead of getting treated by a doctor. Salts were one of the best home remedies that was popular in ancient times. Salts were added to hot water and soaking body in that water results in relieving muscular pain and cramps. These salts helps to treat many skin disorders including erythema and makes the skin soft and supple. It reduces dryness and flaking of the skin. Some of the salts have anti-fungal and anti-bacterial properties which helps to treat many fungal and bacterial infections.

Fig. 2: Crystals of Epsom Salt & Himalayan Pink Salt (Self)

Types: As we know that bath salts serves various functions which are described in the above lines. Some bath salts are added to water to give water a pleasant smell and color. But on the other hand, some bath salts are present in the market which contains foaming agents and surfactants to increase the foaming capacity of bath salts. They are not only classified based on foaming and non-foaming bath salts, but also based on their manufacturing process and ingredients used for therapeutic purposes.

1. Based on foaming properties:

Based on foaming properties of bath salts, they are classified into two types, which are a) Foaming bath salts and b) non-foaming bath salts.

a) ***Foaming bath salt-*** Foaming bath salt produces a decent amount of foam when dissolved in water. The main ingredients due to which the foam is produced are surfactants and foam boosters. Surfactants are ingredients that reduces the surface tension of water and produces foam when contacts water. Surfactants are also good cleansing and wetting agents, that is, they do not only produce foam but also have cleansing properties. Foaming bath salts contains liquid surfactants because of which the manufacturing process of this type of bath salts are different and lengthy.

Fig. 3: Foam Produced by Bath Salt (Self)

b) ***Non foaming bath salt-*** Non foaming bath salts are meant to add color and fragrance to the water. As the name suggests, it does not produce foam and is used for aesthetic purposes. The formula of bath salt only contains crystal or powder ingredients and does not contain any liquid surfactant or foam boosters; hence its manufacturing procedure is very simple. It helps to harden soft water, but the cleansing property is less in comparison to foaming bath salt.

2. Based on manufacturing process:

a) ***Dry method –*** As the name suggests, dry method is the method of preparation of bath salt in which the bath salt only contains ingredients which are present in either dry, powder or crystal form. This method is the simplest method of manufacturing of bath as it is time and energy efficient. It does not need time to get dry as it does not contain any liquid ingredients. All the powders are simply mixed with color and packed in containers. These bath salts fall in the non-foaming bath salt category as well.

b) ***Damp method-*** Damp method for preparation of bath is the method which is used in the manufacturing of the preparation given below. This falls in the category of foaming bath salts. It does contain liquid surfactants, oils, or other liquid actives which takes time to get dry in the formulation of bath salt. Hence this method is time consuming as well as it needs skilled workers to formulate this type of bath salts. This method is also energy consuming and has a higher risk of contamination either by microorganisms or by external factors. These are some main drawbacks of this type of formulation but are very effect by means of therapeutic actives.

Fig. 4: Drying Process of Bath Salt (Self)

Formulation:

Table 1: Formulation of Foaming Bath Salt

Sr no.	Ingredients	Role of ingredients	Quantity (100%)
1.	Epsom salt	Solar salt,	30%
2.	Himalayan pink salt	Softens hard water	30%
3.	Sodium Bicarbonate	Foaming	10%
4.	Decyl glucoside	Surfactant	15%
5.	Cocoamidopropyl Betaine	Co-surfactant	7%
6.	Sweet almond oil	Carrier oil	5%
7.	Pigment	Color	1.5%
8.	Perfume	Fragrance	1.5%
9.	Ethylenediamine Tetra Acetic Acid	Chelating agent	0.01%

Requirements: Weighing balance, butter paper sheet, cling foil, beaker, stirrer, bowl, mortar pestle, gloves.

Steps of method of preparation: Following steps are followed up for the preparation of bath salt from the above given formula-

i. Weigh all the dry ingredients (Epsom salt, Himalayan pink salt, sodium bicarbonate, non-bleeding mica powders) effectively use weighing balance [Phase - A]. Make sure that you are wearing proper gloves and a mask.

ii. Mix all the dry ingredients and make sure that the color is equally mixed with all the other ingredients. Cover the bowl containing dry ingredients with a cling foil and keep it aside.

iii. Take a beaker and measure all the liquid ingredients (surfactants, oils, perfume) together in the same beaker [Phase - B].

iv. Remove the cling foil from the bowl, gradually mix the dry ingredients with the help of hands and add phase – B to it while mixing. Check the binding and consistency of the preparation.

v. Sanitize a large flat area using rubbing alcohol and spread butter paper sheets on the surface. Spread a thin layer of damp mixture of bath salt on the butter paper sheet to let it dry for 48 hours. Make sure that the salts are properly dry and does not contain any moisture in it.

vi. Gently remove the dried bath salt flakes and add it to a mortar. With the help of a pestle, slowly start triturating it until it gets transformed into crystal form. At this stage you can add glitter or dried flower petals to make it more attractive or can add as a top layer while filling into the container.

vii. Properly add it into an airtight container and label it.

Fig. 5: In-Process manufacturing (Self)

Claims:

1.Reduces hardness of water.
2.Increase cleansing properties of water.
3.Produce good amount of foam.
4.Gives a pleasant fragrance and calming color to water.
5.It is not harsh on skin.
6.Does not disturb normal pH of the skin.
7.Chloride and paraben free.

Testing:

1. **Quality of reagents:** All the chemicals used in the testing of the product must be pure and the water which is used must be demineralized water.

Result- All the ingredients which are used the preparation of bath salt are pure.

2. Determination of pH:

pH of the bath salt is conducted to maintain the pH of the product according to the pH of the skin. This test should be conducted at 27° ± 2°C.

a) Weight 5 grams of the bath salt accurately and preserve the sample for the test.
b) Make 5% solution of the sample by dissolving 5 grams accurately weighed bath salt into 95 ml demineralized water. Stir it until the bath salt gets completely dissolved in water.
c) Transfer 20 ml of the sample solution to a sterilized beaker, cover the beaker and keep it aside for further testing.
d) Calibrate pH meter by washing its glass electrode with DM water → dip it in buffer solution of 4 pH → note the readings → dip the glass electrode in buffer solution of 7 pH → note the readings → wash it again with water and let it dry.
e) Dip the glass electrode in the sample solution for 3 minutes until the value stops fluctuating and gives consistent reading.
f) Note the reading.

Result- The pH of the bath salt came out to be 5.7.

3. Determination of Foam Height:

a) Make 2% solution of the sample by adding 2 grams accurately measured bath salt into 98 ml of DM water. Stir well until the bath salt gets completely dissolved in the water.
b) Transfer the solution into 250 ml graduated cylinder and cover its mouth using a cork.
c) Shake the cylinder 13 times in upside down moment.
d) Let it stand for 1 minute and then record the height of the foam produced in the cylinder.
e) The height of the foam produced must not be less than 150 mm.

Result- This bath salt produces a nice amount of foam. The foam height of the solution of bath salt and water recorded is 132 mm.

Fig. 6: Determination of Foam Height (Self)

4. Determination of Chloride:

a) Make a 3% solution of sample by adding 0.3 grams of bath salt in 10 ml of water.
b) Transfer the solution into a 50 ml Nessler's cylinder.
c) Add 10 ml diluted nitric acid (5 N) and 1 ml of 5 % silver nitrate solution to it. Dilute the solution up to the mark. Mark the cylinder as "sample."
d) Carry out a limit test by taking another Nessler's cylinder and mark it as "standard".
e) Add 1 ml of standard sodium chloride solution (0.01 N).
f) Add 10 ml diluted nitric acid (5 N) and 1 ml of 5 % silver nitrate solution to it. Dilute the solution up to the mark.
g) Stir both the cylinders well and let it stand for 15 minutes.
h) Compare both the cylinders in front of a black background to determine the turbidity and opalescence of both the solutions.

Result- The prepared bath salt is free from chloride and parabens.

5. Determination of Hardness of Water:

a) Take a burette and fill it with standard EDTA solution which is prepared by dissolving 4gm EDTA and 0.1gm magnesium bicarbonate in 800 ml DM water.
b) Take 50 ml of sample water in a conical flask and add 1 ml ammonia buffer to it.
c) Add 5 – 6 drops of Ericrome black indicator. The solution will turn wine red in color.
d) Note the initial readings and titrate the sample solution against the standard solution of EDTA.
e) The color changing into blue can be visible at the end point.
f) Note the final reading and repeat the process 3 times to get concordant readings. Calculate the mean value.
g) Prepare 10% solution of bath salt by adding 5 grams of bath salt in 45 ml of the same sample of water which is used for the previous test.
h) Transfer 50 ml of the solution to another conical flask and repeat the same process which is done for the 1st sample.
i) Sample 2 (containing bath salt) changes its color from wine red to blue instantly after the addition of Ericrome black T indicator while the sample 1 (without bath salt) changes its color in a while after the addition of Ericrome black T indicator.

Result- This bath salt decently reduces the surface tension of water and reduces its hardness.

Fig. 7: Determination of Hardness of Water (Self)

6. Determination of Mica powder used:

a) Particle size of the fine mica powder must be in between 100 µm to 40 µm.
b) Minimum 85% of the mica powder must be retained from the fine mesh and the amount of mica which does not retain through the coarse mesh must not exceed 15%.
c) Mica powder which is used in the manufacturing of the product must be clean, fine, non-toxic, and free from moisture and impurities.

7. Patch test:

a) Prepare 10% solution of the sample.
b) Mark an area of 2.5 × 2.5 cm on the skin and apply a thin layer of the solution on the marked area.
c) Cover the marked patch with a bandage and leave it for 24 hours.
d) Remove the bandage after 24 hours and examine any changes in the skin.
e) Stop using the product if any redness, itchiness, or irritation is observed on the skin.

Result- It does not cause any skin or eye irritation and makes the skin soft and supple.

Packaging: The prepared bath salt holds ingredients like sodium bicarbonate, fragrance oils, surfactants and dried flower petals which are vulnerable to direct air contact. These ingredients may lose their property when left open. Salts, the main ingredients of bath salt may absorb moisture from the external environment and can get moist. To avoid such conditions, bath salt is packed in either plastic or glass jars or bottles with airtight closure. As bath salts are used for aesthetic purpose, it is advisable to store them in attractive packaging. The outer packaging must include a label containing name of the product, name of the variant or fragrance, manufacturing date and expiry date and most important, ingredients of the product.

Fig. 8: Airtight Glass Test-Tube Packaging (Self)

Discussion

This research paper discusses the formulation and manufacturing of the recently used most popular bath preparation which is bath salt. Centuries ago, people used different salts to soften hard water. During older times, salts were often used for their healing properties. Salts were also quite common in general medicines for treatment of variety of health conditions which includes skin rashes, inflammation, redness, sore muscles, arthritis etc. The concept of bath salts was first raised when the demand of hot spring bath increased rapidly. People used to visit hot spring bath house to soak their body in lukewarm mineral water to relax and calm their body, to cure any clinical conditions and to interact with people for basic communication. The hot spring water is mineral water and holds carbonates and bicarbonates of different minerals. These salts are readily soluble in water and are beneficial for relaxation and curing different conditions. Some people also started using lava stone also known as volcanic stone for many therapies as it is known for its healing properties, relaxation properties and it does have strength to flush out any negative vibes from the body and mind. By researching and combining all the information together, the concept of bath salts has been raised.

Future Scope

After a tiring day, a wonderful method to unwind is by indulging in a relaxing, warm bath. Elevating this experience can be achieved by incorporating bath salts. The trend of using bath salts and bath bombs has gained significant popularity, especially amid today's fast-paced lifestyle. This product category is rapidly expanding globally, presenting a profitable opportunity for small scale entrepreneurs. The uncomplicated formula for creating and selling bath salts has contributed to its market success. This formulation holds naturally obtained green surfactants which are suitable for sensitive skin and even used in baby shampoos. For future startups, these types of formulations are easiest type of DIY (Do It Yourself) product as it is easy to formulate, evaluate and use. Due to its benefits like cruelty free, vegan, skin pH friendly and its aesthetic appearance, it is gaining popularity among the consumers and personnel, body care market.

Conclusion

This research paper initially defines the term "Bath Salts". For the further followed by describing about its purpose of use and its types. Bath salts are used for several purposes such as cleansing, foaming, relaxation, therapeutic treatment and for aesthetic appearance. It helps in healing dermal as well as other clinical conditions. Furthermore, it contains formula for preparation of bath salts. The main ingredients of the formulated bath salts are Himalayan pink salt, Epsom salt, Sodium Bicarbonate and some mild surfactants with chelating agents, color and perfume. All the salts help to reduce the surface tension of water and helps to cure many skin problems. Finally, it deals with the claims and testing of the same.

Reference:

1) Takeo Mitsui. New Cosmetic Science. 2nd edition, History, and purposes of bath preparations. page no. 473 - 475. (1993)
2) P.P. Sharma Cosmetics: Formulation, Manufacturing & Quality Control. Vandana Publications, Page no. 321-324. (2018).
3) Indian Standard IS 2730 (1977): Magnesium sulphate (Epsom salt) [CHD 1: Inorganic Chemicals]
4) Indian Standard IS 2124 (2000): Sodium Bicarbonate [CHD 1: Inorganic Chemicals]
5) Indian Standard IS 7884 (2004): Shampoo, Surfactant based [PCD 19: Cosmetics]
6) Indian Standard IS 13884 (1993): Muscovite Mica Flakes and Mica Powder for Industrial Applications [ETD 2: Solid Electrical Insulating Materials and Insulation Systems]
7) 2193_expriment 6.pdf.
8) Sanya Hamdani. The right way to patch test a skincare product for allergic reaction. Sep 29, 2020.
9) Indian Standard IS 2730 (1977): Magnesium sulphate (Epsom salt) [CHD 1: Inorganic Chemicals]
10) Indian Standard IS 2124 (2000): Sodium Bicarbonate [CHD 1: Inorganic Chemicals]
11) Indian Standard IS 7884 (2004): Shampoo, Surfactant based [PCD 19: Cosmetics]
12) Indian Standard IS 13884 (1993): Muscovite Mica Flakes and Mica Powder for Industrial Applications [ETD 2: Solid Electrical Insulating Materials and Insulation Systems]