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Research Article

**FORMULATION AND EVALUATION OF ANTIOXIDANT
ACTIVITY OF HERBAL PAPAYA SOAP**

Amol Supekar¹, Sandip Khandagale², Sakshi Shinde³, Snehal Thorat⁴, Shital Rokade⁵
Abasaheb Kakade collage of B Pharmacy, Bodhegaon Dist- Ahmednagar Maharashtra,
India -414503

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Abstract:

Plants have long been thought to be a rich source of bioactive chemicals with medicinal properties, according to traditional medicine. *Carica papaya* Linn, often known as pawpaw, is a monoecious, dioecious, or hermaphrodite tree that belongs to the Caricaceae family. It is known as a nutraceutical fruit and can be employed as a valuable and promising natural medicinal plant due to its antioxidant, antibacterial, antihelminthic, antifungal, antihypertensive, antifertility, and free radical scavenging characteristics. As a result, *C. papaya* is regarded as the king of medicine due to its extensive pharmacological potential and medicinal benefits of various papaya sections. The current study is concentrating on the nutritional benefits of papaya as a natural therapeutic plant.

A produced active component consisting of crude papain enzyme is a solid soap formulation with antioxidant origin from fresh papaya, and it may be employed as soap in this research work to improve human skin health. The benefits of adding crude papain enzymes that are safe for the skin were investigated in this study, with the goal of creating a solid soap formula that fulfils SNI 1996 standards. Formula IV, which complies with SNI 1996, is a soap formula, and other formulae with an IC50 value of 13,657 ppm have the maximum antioxidant activity. When compared to soap, the % dirt removal value for the negative control (with enzyme) is higher.

Papaya (*Carica papaya* linn) is well-known around the world for its remarkable nutritional and therapeutic benefits. The entire Papaya plant, including its leaves, seeds, ripe and unripe fruits, and their juice, has been utilised as a traditional medicine since time immemorial. The fruit is oval in shape with a yellowish-green exterior and yellow flesh.

Keywords: papain, antioxidant, solid soap, carica papaya linn.

Corresponding author:**Amol V. Supekar ***E-Mail: supekaramol123@gmail.com.

QR code



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INTRODUCTION:

Ayurveda, the Indian system of medicine, is attained superior attention and popularity in many parts of the world. The disease protective and health primitive approach of Ayurveda, which takes into consideration the entire body, mind and spirit while dealing with the maintenance of health promotions, now enjoys increasing acceptability. Ayurveda had developed certain dietary and therapeutic measures to delay aging and rejuvenating whole functional dynamics of the body organs. This revitalization and rejuvenation is known as the 'Rasayanachikitsa'. Herbs are staging a comeback and herbal 'renaissance' is happening all over the globe. The herbal products today symbolize safety in contrast to the synthetics that are regarded as unsafe to human and environment. Although herbs had been priced for their medicinal, flavoring and aromatic qualities for centuries, the synthetic products of the modern ages surpassed their important, for a while.

The naive reliance on synthetics, however, is coming to an end, and people are returning to naturals in the hopes of finding safety and security. Numerous herbal medications with psychotropic potential have been described in ancient pharmacopoeias from around the world. These provide a diverse range of possible compounds for development into current psychiatric medicines. Indeed, plants are the source of about 25% of today's conventional pharmaceuticals; several valuable psychoactive compounds, such as yohimbine, ephedrine, tubocurarine, and galanthamine, were discovered through the study of indigenous remedies.

More than just a delicious fruit, papaya is a source of nutrients with a number of health benefits. According to 2013 paper, the many benefits of papaya can be attributed to the high content of vitamins A, B, C. Its proteolytic enzymes, such as papain and chymopapain also have antibacterial, antifungal, and antiviral properties. Papayas have gained popularity as a natural home treatment, and for their use in skin and hair products. Their benefits vary and are summarized in the table below

Table no-1

Skin benefits	Hair benefits
Wrinkle reduction	Conditioner
Acne control	Hair growth
Melisma treatment	Dandruff prevention

Pawpaw grows in a natural way in many humid and subtropical areas. Pawpaw contains thiol and protease

active enzymes, which are present in soap to crash determined fibrin in the epidermis and, as a result, desquamate the epidermal cell that has died. Because of its alchemical component, papaya-related castile soap is available for purchase or sale as pawpaw castile soap. Pawpaw castile soap is popular for its skin-whitening properties because it contains ingredients including water, acetate, and pawpaw, which cause the epidermis to lose its colour (pigmentation).

The enzyme papain, which is found in the back of the pawpaw or latex, helps to smooth and brighten the epidermis (skin). The use of pawpaw castile (soap) on a regular basis can brighten supple epidermis (skin).

Enzyme carries out all chemically brightening the skin but no later it exfoliates off outermost surface of skin achingly can possess sunburnt or tan. Likewise, when papaya is utilized in a Castile, it dissolute the deceased dermis on the exterior part of your face, makes it functional as and desquamate whatever disclose your healthy epidermis cells.

According to Wall, the fruit contains more fibers, supplements, nutrients C (51.2 mg/100g), carotene, antiophthalmic components such as provitamin A (232.3ug/100g) and cryptoxanthol (594.3 ug/100g), as well as magnestic element (19.2-32.7 mg/100g). It also contains spapaia, which is an important component of pawpaw (dry material) and is widely used in medicine. Over the past year, papaya and endomysium, among others, have displayed a variety of pharmamedical and medical aids, including eliminating fibrin from blood type wounds and taking action to cure or manage puffiness or lump. Equatorial pawpaw treats burn injuries due to its protease content.

Anomalies such as pfpapaia, endonuclease, leukopenia, and chymopoiesis are allowed to make wound cleansing easier, develop, or help to improving the quality of masks left on black tissue areas. There are differences in pawpaw fruit due to different types.

Although pawpaw is safe to eat and a tasty berry, it has been used to treat a variety of diseases and ailments, ranging from gastrointestinal disorders to respiratory disorders, gonorrhoea, and venereal disease. To avoid cur, the herb is frequently cinerated in tandem with verdant auxiliary. The frond has also been used to mend or cure tape worms and pin

worms (internal parasites) in broth or fermentation (infusion).

To be extremely effective in the treatment of diarrhoea the fruit has a good reputation as a hepatoportal emissary. Unripe immature pawpaw is consumed and used in a concoction on the supposition of cynical and lcterus or chlamydia. Throughout the period, it has been used as an antihelmintic or deworming, and the entire fruit of the pawpaw has been boiled and used as a drink to cure lesion. In Madagascar, pawpaw leaf tea has been used in the treatment of lesions, abscesses, intestinal difficulties, and ordinary intestinal pain. Extract or a concentrated fluid formed from ripe seeds is called tion or extract in the Congolese region of Africa. According to the review, the pawpaw was high in carbs, starch, and sugars.

Oloyede et colleagues. Has suggested that comedy reduces the oxidation effects of the ethanoate content of immature fruit pawpaw mush in rodents. Quercetol and angelicin are derived from hydroxylmethane latex and then from liquid-latex extracted from immature pawpaw fruit using the Fraz von Soxhlet extractor. They went on to look at the antioxidative capabilities of pawpaw fruits in mice in the lab, and the results showed a significant increase in glutamine ewduction. As a result, it was proposed that immature pawpaws are used to treat illness, but that they frequently induce diabetes, haemoglobin S disease, and cardiac arrest.

From the exterior, the skin serves as a protective barrier for the body, but it can cause a variety of issues, such as chronic diseases like cancer, dry skin, and premature ageing. It's possible that air pollution is to blame for the results, which reveal that ultraviolet radiation leads to a lack of cleanliness and an increase in free radicals. Soap is generated from animal fats or vegetable oils that contain potassium or sodium salts of fatty acids and should be used on a regular basis to maintain healthy skin. Natural nutrients combined with soap provide the most nutrition to the skin, whilst chemicals have unwanted effects.

Papain, an enzyme found in papaya soap, has a higher activity in breaking down proteins into amino acids and peptides. Papain can be utilised as an active ingredient in skin cleansers because it dissolves dead cells that have stuck to the skin and are difficult to remove physically. Antioxidants are compounds that neutralise free radicals and prevent damage produced by free radicals in the body, including the skin.

We can create solid soap that contains antioxidants as a crude enzyme papain from papaya latex and a crude form of papaya fruit in this study.

Oxidation

An atom increases the number of links it has to oxygen, decreases the number of bonds it has to hydrogen, or loses electrons during oxidation. Phenols (such as morphine), catecholamine's (such as adrenaline (epinephrine) and noradrenaline (norepinephrine), and polyunsaturated compounds (such as oils, fats, and fat-soluble vitamins (e.g. vitamins A and E) are all affected. The opposite process is reduction, which occurs when an atom, molecule, or ion gains electron or has its oxidation status reduced.

Researchers have been interested in oxidative stress. Oxidative damage to proteins, fats, nucleic acids, and carbohydrates results from a clash between free radicals and antioxidants. Antioxidants have shielded the body from the detrimental effects of free radicals. Extrinsic agents are the result of exposure to external elements, particularly UV radiation without protection, which affects the rate of normal skin ageing by forming free radicals that attack the skin structures, destroying collagen and elastic fibres and impairing hydration, resulting in dyschromias, changes in skin relief, and wrinkles. At its most basic level, oxidation is the loss of electrons that occurs when one or more electrons are lost by an atom or molecule. Some elements are more prone to losing electrons than others. These aspects are mentioned.

When an atom, molecule, or ion loses one or more electrons in a chemical reaction, it is called oxidation. Oxidation and reduction are complimentary processes that entail electron release and uptake, respectively. In redox processes involving covalent bonds, such as in alcohols, these electron transfer mechanisms only occur to a limited extent. Although covalently bound carbon is surrounded by the same number of electrons before and after oxidation, the oxidation state might change because electrons are assigned to the most electronegative atom in the bond. Oxidation is the loss of electrons at its most fundamental level. It occurs when one or more electrons are lost from an atom or molecule. Some elements are more prone to losing electrons than others. These are the ingredients

Alcohols, alkyl benzenes, aldehydes, alkenes, and amines undergo two-electron transfer reactions, while oxidation occurs by on-electron transfer, resulting in oxidised degradation products in the presence of oxygen in the atmosphere.

The Process of Oxidation

The properties of an atom or compound alter as it is oxidized. When an iron thing, for example, gets oxidized, it is altered because electrons are lost. Oxidized iron is a brittle, reddish powder, whereas oxidized iron is a strong, structurally sound metal. The following diagram depicts what happens to an atom of iron as it oxidizes:

Because iron is rapidly oxidised, it's critical to keep it out of contact with oxygen and moisture. As long as oxygen is there, iron will continue to lose electrons to it. When iron is oxidised, it takes on a charge. It now has a positive charge of three after losing three electrons. The number three and are used to indicate this positive three charge.

Risk factors:

Free radicals are produced naturally in everyone's body as a result of processes like exercise or inflammation. This is natural and is part of the body's complex mechanism for maintaining health.

Citrus fruits

Dark leafy greens

Broccoli

Carrots

Olives

A regular, moderate exercise routine.

This has been linked to higher amounts of natural antioxidants and less oxidative stress damage. Exercise has been associated to a longer lifespan, less ageing symptoms, and a lower chance of cancer and disease.

Don't smoke. Avoid exposure to secondhand smoke as well.

Use caution with chemicals.

Cleaning chemicals, avoiding needless radiation exposure, and being mindful of other chemical sources, such as pesticides used on food or in gardening, are all examples of this.

Antioxidant trials oxidation hypothesis

At first glance, it might seem that these negative results close the book and that additional clinical trials of any antioxidants would be pointless. Closer examination, we believe, will show that such a conclusion would be premature and inappropriate. The oxidative modification hypothesis is not that

vitamin E will improve the human condition but that oxidative modification of LDL and/or other oxidative processes play a substantial role in human atherogenesis as it does in animal models of atherogenesis.

Oxidation kinetics working hypothesis:

A closed-form kinetic hypothesis for zirconium oxidation was developed by assuming a constant strain-energy gradient as a diffusional driving force in addition to an oxygen chemical potential gradient, and quantitatively verified using thermogravimetry in the air atmosphere over a temperature range of 400–800 °C. The protective scale is a mixed ionic electronic conductor with an ionic transference number of 0.5, according to the open-circuit potential measurement. As a result, the intrinsic diffusivity is thought to represent a Nernst-type combination of partial conductivities of oxide ions and electrons. .

Hypothesis of oxidation.

According to the oxidation theory, low density lipoprotein must be oxidative changed to cause atherosclerosis pathology. In this article, we review recent research on the pathways that increase LDL oxidation in vivo and the effects of antioxidants on atherogenesis in animals, with a focus on the clinical implications of these findings for the oxidation hypothesis.

Cultivation and description

The papaya is currently grown in most tropical countries, originally from southern Mexico (particularly in Veracruz), Central America, and northern South America. In cultivation, it grows quickly, fruiting in three years. Because it is highly forest sensitive, it can only be grown in tropical areas. Temperatures below 29 degrees Fahrenheit are extremely dangerous but not lethal. Growth in Florida is mostly restricted to the state's southern regions. It also prepares sandy, well-drained soil, because standing water will kill the plant in less than 24 hours. The papaya's reproductive system is moderately complex. Male, hermaphrodite, or female plants exist. Male trees are unusual, but they do occasionally appear when homeowners collect their own seeds. The commercial standard is Hermaphrodite trees, which produce a pair-shaped fruit.

Taxonomical classification

Table no-2

Kingdom : Plantae	Varnacular names
Subkingdom : Tracheobionta	Hindi : Papita
Division : Magnoliophyta	English : Papaya
Class : magnoliopsida	Eclectics : Papaw
Family : Caricaceae	Brazil : Mamao
Genus : Carica L.	Caribbean : Ababai
Species : Carica papaya L.	Cuba : Fruta de bomba

Morphology:

Because papaya is a polygamous species, determining whether a plant is male, female, or hermaphrodite can be challenging. It is a palm-like tree with a fleshy stem characterized by scars where leaves have fallen off and topped by a terminal panache of leaves on long petioles with 5-7 lobes. Fruit a large berry, varying in size, elongate to globose with a large central cavity, seeds black, tuberculosis, and enclosed in a transparent aril; male flowers in lax many-flowered, densely pubescent cymes at the tips of the pendulous, fistular rachis; female flowers large, solitary or in few flowered racemes, with a short thick rachis; The fruit-bearing trees are under the age of 18 months.

The papaya is a big tree-like plant with spirally arranged leaves confined to the summit of the trunk. Where leaves and fruit were borne, the lower stem is visibly damaged. The leaves are enormous, measuring 50–70 centimeters (20–28 inches) across. Unless lopped, the tree is normally unbranched. The flowers resemble Plumeria blossoms in form, although they are much smaller and waxier. They emerge from the leaf axils and mature into huge 15–45 centimeters (5.9–18 in) length, 10–30 centimeters (3.9–12 in) diameter fruits. The fruit is ripe when its skin is amber to orange in colour and feels soft (like a ripe avocado or a little softer). The melon-like fruit hangs from short, thick peduncles and varies in size and shape. The bark can be used to make rope, while the leaves can be used as a soap alternative and stain remover. Finally, even the flowers are consumed in Java.

Chemical Constituents:**Fruits:**

Minerals: calcium, phosphorous, iron, vitamin C, thiamine, riboflavin, niacin, and carotene, amino acids, citric and malic acids (green fruits), volatile compounds: linalool, benzyl isothiocyanate, cis and trans 2, 6-dimethyl-3,6 epoxy-7 octen-2-ol, Alkaloid; carpaine, benzyl—D glucoside,.

Juice:

N-butyric, n-hexanoic and n-octanoic acids, lipids; myristic, palmitic, stearic, linoleic, linolenic and cis-vaccenic and oleic acids.

Seed:

Fatty acids, crude protein, crude fibre, papaya oil, sinigrin, Carpaine, benzylisothiocyanate, benzyl glucosinolate, glucotropacolin, hentriacontane, -sitosterol, caricin, and an enzyme called myrosin, as well as leaves associated alkaloids, flavonoids, saponins, tannins, cardiac glycoside, anthraquinone

Histological Development

Papaya, commonly known as papaw or pawpaw, is the succulent fruit of a big plant in the Caricaceae family. Although its origin is unknown, the papaya may be a hybrid of two or more carica species endemic to Mexico and Central America. It is now grown all across the tropical world and in the warmest sections of the subtropics. The papaya fruit is mildly sweet and has a pleasant musky flavour that is stronger in some types and climates than in others. In many nations, it is a popular breakfast fruit that is also used in salads, pies, sherbets, juices, and confections. Unripe fruit can be cooked in the same way as squash.

C. Papaya is said to have originated in the southern Mexican and Costa Rican regions before being introduced as a plantation crop in tropical and subtropical countries. It is thought that papaya seeds were conveyed and dispersed to the Caribbean and Southeast Asia during Spanish discovery in the 16th century.

Nature has long been thought to be a source of numerous medicinal plants that benefit in a wide range of human treatments. Papaya is a fragrant evergreen tropical plant that produces papaya fruit all year long. It is the most frequently cultivated and best-known species due to its therapeutic effects and

other nutritional activities. Carica Papaya Linn is the scientific name for a juicy and testy fruit that belongs to the genus Carica and the family Caricacea. Christopher Columbus dubbed papaya "Angels' Fruit." Papaya had spread over the globe by the mid-seventeenth century. Papaya was first introduced to Hawaii in the 18th century, and it is now the only commercially produced papaya in the United States.

A small industry had developed in Florida in the first part of 20th century, but declined rapidly due to a virus viz Papaya-ringspot- virus that affected papaya fruit. In fact, the recent decline of the Hawaii industry was caused primarily by the same pathogen (Papaya – ringspot- virus) that destroyed plants in Florida.

Methodology:

Preparation of solid soap: -

To Prepare Soap we take the required quantity of base in 500 ml of beaker and maintain the temperature at 45c to heat the soap base on the water bath without stirring. Then the soap base will be converts into liquid form and then add the all ingredients to the above mixture. Boil the mixture 45c on the water bath to obtain proper mixture without stirring. Then the mixtures poured into the soap moulds and freeze the soap containing moulds and freeze the soap containing mould up to 2-3 hours after 2-3 houses remove the soap moulds from the freeze. Allow to 5 minutes then soap will be formed.

Formulation Table

Table no-3

Ingredients	Quantity
Papaya Powder	15 gm.
Sandle Wood Oil	3-4 Drops
Turmeric	0.6 gm.
Honey	1.3 gm.
Vit E Capsule	5 Drops
Rose Water	qs
Soap Base	83 gm.

Papaya



Figure no-1

Botanical Name – Carica Papaya

Biological Source – Papaya (Carica Papaya), also called Papaw or Pawpaw, succulent fruit of a large plant.

Family – Caricaceae

Geographical Source – Mexico and Central America

Chemical Constituent – Carbohydrates, Proteins, Alkaloids (Carpaine and Pseudocarpaine) Protolytic Enzyme

Description

Colour – Green Yellowish and Orange

Odour- Strong Odour

Taste – Sweet and Juicy taste

Use – Papaya products help to reduce acne by removing dead skin cells.

- Papaya is also used skin whitening

Honey

Figure no-2

Botanical Name – *Apis mellifera*, *Apis dorsata*

Biological source – Sugary Secretion deposited in honey comb by the bees.

Family-Apidae

Geographical Source- Africa, Australia, New Zealand, California and Gums

Colour- Pale Yellowish to Yellowish Brown.

Odour – Characteristic, Pleasant.

Taste-Sweet and Faintly acid

Solubility-Soluble in water Insoluble in alcohol

Use- Demulcent, Sweetening agent Antiseptic Vehicle for Ayurvedic Formulation

Turmeric:

Figure no-3

Botanical Name-Indian Saffron , Haldi

Biological Source-turmeric consist of dried, as well as fresh rhizomes of plant known as *Curcuma Longa* Linn

Family-Zingiberaceae

Geographical Source-West Pakistan , India , Malaysia, and China In India Maharastra,Tamil Nada , West Bengal , up and Punjab

Chemical constituent-Volatile oil, Resinous matter, Starch, Curcuminoids

Use- Improve skin health and cures acne

Sandle wood

Figure no-4

Botanical Name-Yellwish Sandle Wood, Lignum Santali

Biological Source- dried heart wood of Santalum album

Family- Santalaceae

Chemical constituent- Sandle wood oil, contains 95% two isomeric

Colour- yellowish or Pale raddish

Odour-Strong and Fragrant

Taste- Slightly bitter

Used- Antiseptic, Expectorant, Colouring agent, Flavoring agent

Vitamin E:

Figure no-5

Vitamin e is the term that refers to various forms of Alpha-tocopherol. The exact biochemical function of vitamin e is unknown, but the antioxidant properties of the vitamin have been implicated.

Vitamin E uses:

1. Moisturizing skin. ...
2. Wound healing.
3. Skin cancer prevention. ...
4. Reducing skin itching. ...
5. Eczema. ...
6. Psoriasis. ...
7. Preventing or minimizing the appearance of scars. ...
8. Preventing or treating fine lines and wrinkles.

Rose water

Figure no-6

Rose water is created by distilling rose petals with steam. Rose water is fragrant, and it's sometimes used as a mild natural fragrance as an alternative to chemical-filled perfumes.

Rose water has been used for thousands of years, including in the Middle Ages. It's thought to have originated in what is now Iran. It's been used traditionally in both beauty products and food and drink products. It also comes with plenty of potential health benefits, including the following.

1. Helps soothe skin irritation
2. Soothes sore throats
3. Reduces skin redness
4. Helps prevent and treats infections
5. Contains antioxidants
6. Heals cuts, scars, and burns
9. Has anti-aging properties

RESULT:

The soap made was evaluated for physicochemical characters such as PH, foam ability, foam retention, foam height, irritation test, user satisfaction test and the improvement of skin colour level and for other parameters, good characteristics were observed.

Physical parameters:

In this test colour, odour, texture, and state of soap are observed.

Table no-4

Sr No	Parameters	F1S	F2S	F3S
1	Colour	Orange	Orange	Orange
2	Odour	Pleasant	Pleasant	Pleasant
3	Texture	Smooth	Smooth	Smooth
4	State	Solid	Solid	Solid

pH Determination:

The pH was measured with a pH meter, and a 10% soap solution was made with distilled water. After calibrating the pH meter with buffer solution, the electrode was put into the solution. The pH level was measured and recorded.

pH

Table no-5

Sr No.	Formulation	pH
1	F1	9.10
2	F2	9.9
3	F3	9.11

Foam Ability test

In a 20 mL measuring cylinder containing 10 mL of distilled water, 1 gramme of sample soap was introduced. To form foams, the mixture was violently shaken with a vortex. The measuring cylinder was left to stand for 5 minutes after shaking for around 30 seconds (t5). Following that, the height of the foam in the solution was measured and recorded.

Irritation test:

Testing for potential adverse skin effects (irritation and allergy) is required before new skin care products and ingredients are offered to the market. This dermatological test for human irritation was carried out to ensure consumer safety. Under the test conditions, all of the test materials (soap base, orange peel soap, extracted orange oil, and orange Peel Powder) did not cause skin irritation. Furthermore, during the test time, none of the volunteers experienced irritation. It is reasonable to conclude that the two soaps were not likely to cause skin irritation under normal conditions of use.

Irritation test

Table no-6

Sr no	Formulation	Irritant effect
1	F1	Nil
2	F2	Nil
3	F3	Nil

User satisfaction test:

Twenty participants were asked to complete a survey after using both soaps to measure their happiness. A 5-point Likert scale was used to gauge volunteer satisfaction. The texture of orange peel soap satisfied the volunteers to a high degree, whereas the odour of orange peel soap satisfied them to a medium degree. In any event, their overall preference for orange peel soap was strong. The participants were really satisfied with the spread ability of orange peel soap during use. Furthermore, they achieved a high level of absorbable, scrubbing, and moisturised peel soap feeling. In conclusion, the volunteers were really satisfied with the orange peel soap. Similarly, the look of orange peel soap did not change.

The improvement of skin colour level:

Before and after one month of soap application, skin colour improvement was measured using a skin colorbar (customised from Von Luschan's Chromatic scale). The skin colour level improvement was used to determine the scores. According to the findings, orange peel soap had a greater impact on skin colour improvement (different level = 1.150.93) than soap base (different level = 0.700.64).

Foam Height:

A sample of 0.5 grammes of soap was distributed in 25 mL of distilled water. The volume was then made up to 50 ml with water in a 100 ml measuring cylinder. 25 strokes were administered and let to stand until the aqueous volume reached 50 ml, at which point the foam height was measured above the aqueous liquid.

Foam height

Table no-7

Sr.no	Formulation	Foam height (cm)
1	F1	2.5
2	F2	2.6
3	F3	2.9

Foam Retention:

A 100 ml graduated measuring cylinder was filled with 25 ml of the 1% soap solution. Hands were placed over the cylinder and shaken ten times. For 4 minutes, the volume of foam was measured at 1 minute intervals.

Foam Retention

Table no-8

Sr.no	Formulation	Foam retention (per min)
1	F1	2.4
2	F2	1.5
3	F3	0.8

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