



Formulation And Evaluation Gel Face Wash With Microbeads

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<p>Received: 02/08/2023 Revised: 08/09/2023 Accepted: 10/10/2023</p> <p>CC License CC-BY-NC-SA 4.0</p>	<p style="text-align: center;">Abstract</p> <ul style="list-style-type: none">• The formulation and evaluation gel face wash with microbeads containing orange peel is effective for exfoliation, antiacne & removes impurities, germs, dirt and makeup that can irritate the skin.• As per literature review the methods like ionotropic gelation method is used for the preparation of micro beads with sodium alginate and calcium chloride loaded with orange peel.• An attempt is made in this project in order to develop a simple and cost effective antiacne formulation.
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INTRODUCTION OF FACE WASH:

Face wash is also known as Cleanser.

➤ A facial cleanser is a skincare product used to remove make-up, dead skin cells, oil, dirt, and other types of pollutants from the skin, helping to keep pores clear and prevent skin conditions such as acne. Finding the best cleanser can be tough given there are so many options. Knowing the differences between them will help you choose the best products for your skin.

➤ This helps to unclog pores and prevent skin conditions such as acne. A cleanser can be used as part of a skin care regimen together with a toner and moisturizer. A cleanser could be a detergent, and there are many types of cleansers that are produced with a specific objective or focus.

➤ For instance a degreaser or cleanser used in automotive mechanics for cleaning certain engine and car parts. Other varieties include the ones in cosmetology, dermatology or general skin care. In this case, a cleanser is a facial care product that is used to remove make-up, skin care product residue, microbeads, dead skin cells, oils, sweat, dirt and other types of daily pollutants from face.

➤ These washing aids help prevent filth-accumulation, infections, pores clogs, irritation and cosmetic issues like dullness from dead skin build up & excessive skin shine from sebum buildup. This can also aid in preventing or treating certain skin conditions; such as acne.

➤ Cleansing is the first step in a skin care regimen and can be used in addition of a toner and moisturizer, following cleansing. Sometimes "double cleansing" before moving onto any other skincare product is encouraged to ensure the full dissolution & removal of residues that might be more resistant to cleansing, such as; waterproof makeup, water-resistant sunscreen, the excess sebum of oily skin-type individuals and air pollution particles.

PREPARATION OF MICROBEADS: MATERIALS: LIST OF MATERIALS:

SLNO	MATERIALS
1	Orange peel
2	Sodium alginate
3	Calcium chloride
4	Ethanol
5	Distilled water

TABLE-2ORANGE PEEL.**ETHANOL**

Ethanol is also called ethyl alcohol, grain alcohol, drinking alcohol, or simply alcohol) is an organic compound. It is an alcohol with the chemical formula C_2H_6O . Its formula can also be written as CH_3-CH_2-OH or C_2H_5OH (an ethyl group linked to a hydroxyl group). Ethanol is a volatile, flammable, colourless liquid with a characteristic wine-like odour and pungent taste. It is a psychoactive recreational drug, and the active ingredient in alcoholic drinks.

Ethanol is naturally produced by the fermentation process of sugars by yeasts or via petrochemical processes such as ethylene hydration. Historically it was used as a general anaesthetic, and has modern medical applications as an antiseptic, disinfectant, solvent for some medications, and antidote for methanol poisoning and ethylene glycol poisoning. It is used as a chemical solvent and in the synthesis of organic compounds, and as a fuel source

Formula: C_2H_6O

Boiling point: 78.37 °C

Molar mass: 46.07 g/mol

IUPAC ID: ethanol

Density: 789 kg/m³

Melting point: -114.1 °C



CALCIUM CHLORIDE

Calcium chloride is an inorganic compound, a salt with the chemical formula CaCl_2 . It is a white crystalline solid at room temperature, and it is highly soluble in water. It can be created by neutralising hydrochloric acid with calcium hydroxide

Formula: CaCl_2

Molar mass: 110.98 g/mol **IUPAC ID:** Calcium chloride **Melting point:** 772 °C **Boiling point:** 1,935 °C

ChemSpider ID: 23237

Soluble in: Water, Acetic acid, Acetone



Calcium chloride desiccants work well over a temperature range from freezing point up to 80 °C or more.

SODIUM ALGINATE

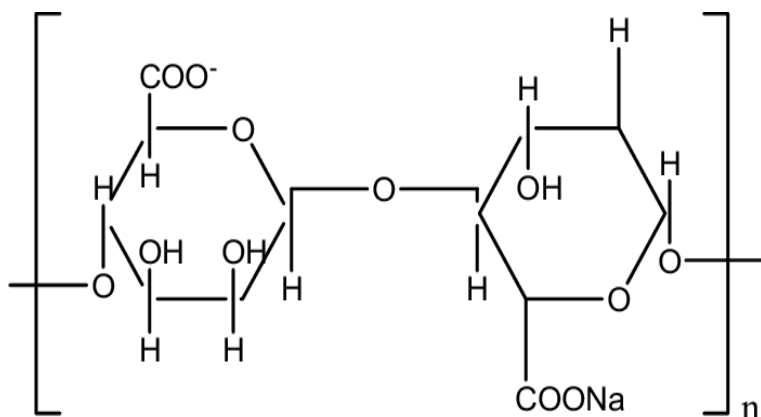
Sodium alginate is a kind of polysaccharide extracted from kelp-like Phaeophyceae; formed by α -L-Mannuronic acid (M section) and β -D-Guluronic acid (G section) connected through 1, 4-glucosidic bond. It's shown white or light yellow powder, odourless and tasteless.

Molecular formula: $(\text{C}_6\text{H}_7\text{O}_6\text{Na})_n$

Thickening: Sodium alginate could be easily dissolved in water and form the solution with high viscosity. It is widely used as a thickening agent in food, daily chemical and other industries. **Gelling:** when the sodium alginate meet with calcium ion exchange action takes place rapidly to form gel, and the gel is anti-reversibility. the high G alginate gel is crispness but much rigid, while the high M alginate gel has the opposite property, flexible with the less rigidity. different strengths of gel made by different proportions. with different gel, alginate can be used for difference of imitated food, medical materials, face masks, water treatment agents, cling film

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etc.



STRUCTURE OF SODIUM ALGINATE



DISTILLED WATER

Distilled water is water that has been boiled into vapor and condensed back into liquid in a separate container. Impurities in the original water that do not boil below or near the boiling point of water remain in the original container. Thus, distilled water is a type of purified water.

APPLICATIONS OF DISTILLED WATER:

In chemical and biological laboratories, as well as in industry, in some appliances deionized water can be used instead of distilled water as a cheaper alternative. If exceptionally high-purity water is required, double distilled water is used. In general, non-purified water could cause or interfere with chemical reactions as well as leave mineral deposits after boiling away. One method of removing impurities from water and other fluids is distillation.

For example, ions commonly found in tap water would drastically reduce lifespans of lead– acid batteries used in cars and trucks. These ions are not acceptable in automotive cooling systems because they corrode internal engine components and deplete typical antifreeze anti- corrosion additives.



Another application was to increase the density of the air to assist early airplane jet engines during take-off in 'hot and high' atmospheric conditions, as was used on the early.

Sonication

Sonication refers to the process of applying sound energy to agitate particles or discontinuous fibres in a liquid. Ultrasonic frequencies (>20 kHz) are usually used, so the process is also known as ultrasonication. Sonication can be conducted using either an ultrasonic bath or an ultrasonic probe (sonicator.)



METHOD

PREPARATION OF MICROBEAD EXTRACTION OF ORANGE PEEL STEP:1 {EXTRACTION PROCESS}

Orange peel extraction of 2-3 Oranges is taken in beaker and (Macerated with 100ml) soaked in 100ml of ethanol for 2-3 days by covering the lid of beaker



**STEP:2**

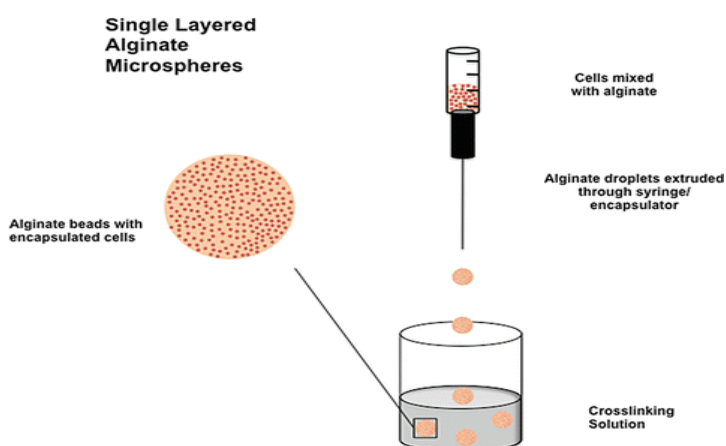
- Weigh accurately 5% w/v sodium alginate [5g in 100 ml of water]
- Weigh accurately drug [Orange peel extraction - 50ml]
- Then add both concentrations in a beaker
- Keep it for sonication up to 5 to 6 hrs
- Weigh accurately 10% w/v calcium chloride

SONICATION METHOD**STEP:3****PREPARATION OF BEADS**

The microspheres were prepared by ionotropic gelation technique. Accurate weight quantity of drug (Orange peel extraction) were added to 5% W/V of sodium alginate solution thoroughly mixed with a magnetic stirrer to form homogeneous polymer. The resulting solution was sonicated for 30 min to remove any air bubbles. For the formulation of microspheres, the mixture is added dropwise from a needle of 22G in a diameter from height of about 5cm to 10% W/V of calcium chloride (CaCl_2) solution stir at 30rpm. The added droplets retained in the calcium chloride solution for 30min to complete then the solution and to produce spherical rigid microspheres by continuous stirring



Then the solution containing microspheres was filtered by using whatmann filter paper and the microspheres were allowed to dry at 40°C for 6 hours and stored in well closed container.



PREPARATION OF GEL FACE WASH LIST OF MATERIALS

SLNO	MATERIALS
1	GLYCERIN
2	METHYL PARABEN
3	PROPYL PARABEN
4	TRIETHANOLAMINE
5	CARBOXY ETHYL CELLULOSE
6	SODIUM LAURYL SULPHATE
7	POLY ETHYLENE GLYCOL (PEG 400)

TABLE-4

GLYCERINE

Glycerin, also known as glycerol, is a natural compound derived from vegetable oils or animal fats. It's a clear, colourless, odourless, and syrupy liquid with a sweet taste. Glycerin is a humectant, a type of moisturizing agent that pulls water into the outer layer of your skin from deeper levels of your skin and the air. In skin care products, glycerine is commonly used with occlusives, another type of moisturizing agent, to trap the moisture it draws into the skin.

- hydrate the outer layer of the skin (stratum corneum)
- improve skin barrier function
- provide protection against skin irritants
- accelerate wound-healing processes
- relieve dry skin
- may help with psoriasis



METHYL PARABEN

Methylparaben, also **methyl paraben**, one of the parabens, is a preservative with the chemical formula $\text{CH}_3(\text{C}_6\text{H}_4(\text{OH})\text{COO})$. It is the methyl ester of p-hydroxybenzoic acid. It has no specific odour or taste, a neutral pH level, and does not discolour or turn murky. This property of methylparaben increases the shelf life of the products. Methylparaben is not available as a separate ingredient and has no such skin benefits. It is incorporated in products. Methylparaben is used in skin care products as a preservative to increase their shelf life. The antimicrobial and antifungal properties of methylparaben make it an excellent choice as a preservative. Since it is used in small concentrations, it is safe on all skin types except sensitive, eczema-prone, and acne-prone skin



PROPYL PARABEN

Propylparaben, the n-propyl ester of p-hydroxybenzoic acid, occurs as a natural substance found in many plants and some insects, although it is manufactured synthetically for use in cosmetics, pharmaceuticals, and foods. It is a member of the class of parabens. It is a preservative typically found in many water-based cosmetics, such as creams, lotions, shampoos, and bath products. As a food additive, it has the E number E216. Propylparaben has antifungal and antimicrobial properties and is typically used in a variety of water-based cosmetics and personal-care products. It is also used as a food additive, and is designated with E number E216. Propylparaben is also a Standardized Chemical Allergen and is used in allergen testing



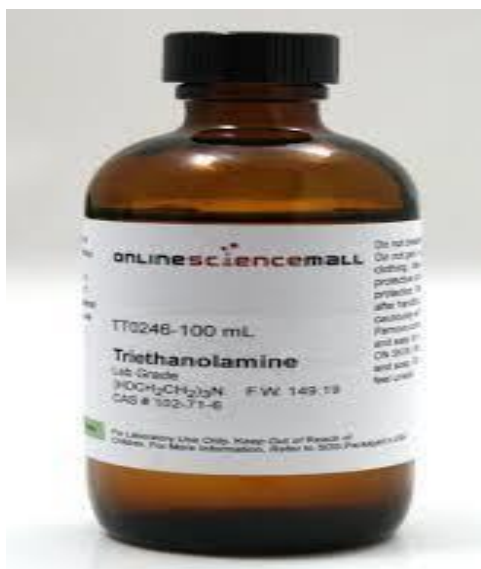
TRIETHANOLAMINE

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Triethanolamine, or TEA, an organic compound with the chemical formula $N(\text{CH}_2\text{CH}_2\text{OH})_3$.

It is a colourless viscous liquid. It is both a tertiary amine and a triol. A triol is a molecule with three alcohol groups. Approximately 150,000 tonnes were produced in 1999. It is a colourless compound although samples may appear yellow because of impurities. Triethanolamine is used primarily in making surfactants, such as for emulsifier. It is a common ingredient in formulations used for both industrial and consumer products. The triethanolamine neutralizes fatty acids, adjusts and buffers the pH, and solubilizes oils and other ingredients that are not completely soluble in water. Triethanolamine salts in some cases are more soluble than salts of alkali metals that might be used otherwise, and results in less alkaline products than would from using alkali metal hydroxides to form the salt.

Some common products in which triethanolamine is found are sunscreen lotions, liquid laundry detergents, dishwashing liquids, general cleaners, hand sanitizers, polishes, metalworking fluids, paints, shaving cream and printing inks. Triethanolamine is commonly used in cosmetic products as a pH adjusting agent, emulsion stabilizer, and surfactant. You can see this ingredient in foundations, lotions, creams, serums, cleansers, and sunscreen.



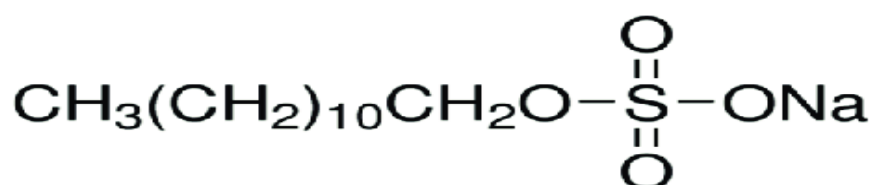
Carboxymethyl cellulose (CMC) or cellulose

cellulose derivative with carboxymethyl groups ($-\text{CH}_2\text{-COOH}$) bound to some of the hydroxyl groups of the glucopyranose monomers that make up the cellulose backbone. It is often used as its sodium salt, sodium carboxymethyl cellulose. It used to be marketed under the name Tylose, a registered trademark of SE Tylose. CMC is used as a viscosity modifier or thickener, and to stabilize emulsions in various products, both food and non-food. It is used primarily because it has high viscosity, is nontoxic, and is generally considered to be hypoallergenic, as the major source fibre is either softwood pulp or cotton linter. Non-food products include products such as toothpaste, laxatives, diet pills, water-based paints, detergents, textile sizing, reusable heat packs, various paper products, and also in leather crafting to help burnish edge. CMC is used in several different personal care applications. It is used in various cosmetic products, creams and lotions, where its good binding, thickening and stabilising properties are utilised.



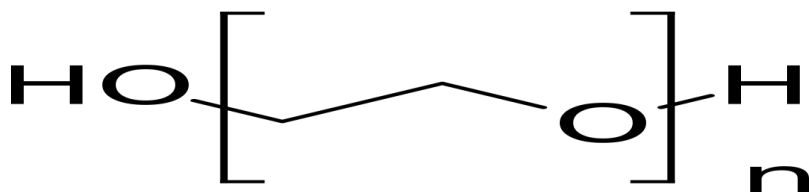
Sodium lauryl sulphate

Sodium lauryl sulphate (SLS) is one of the ingredients you'll find listed on your shampoo bottle. However, unless you're a chemist, you likely don't know what it is. The chemical is found in many cleaning and beauty products, but it's frequently misunderstood. This means it lowers the surface tension between ingredients, which is why it's used as a cleansing and foaming agent. Most concerns about SLS stem from the fact that it can be found in beauty and self-care products as well as in household cleaners. Sodium lauryl sulphate (SLES) is a surfactant with a similar chemical formula. However, SLES is milder and less irritating than SLS. Sodium lauryl sulphate (SLS) is an anionic surface-active agent commonly used in cosmetics. It is well-known for causing skin discomfort, which can lead to altered skin barrier function and water-loss. For this reason, the FDA recommends using less than 1% in personal care products. However, when used appropriately, sodium lauryl sulphate can also provide certain skin benefitting properties.



PEG 400 (polyethylene glycol 400)

PEG 400 (polyethylene glycol 400) is a low-molecular-weight grade of polyethylene glycol. It is a clear, colourless, viscous liquid. Due in part to its low toxicity, PEG 400 is widely used in a variety of pharmaceutical formulations. Polyethylene Glycols are polymers of ethylene glycol. In addition to being named based on the number of units of ethylene glycol, they may also be named based on the molecular weight of the compound. For example, PEG-400 is also known as Polyethylene Glycol 400, where 400 represents the average molecular weight of the compound. It is a viscous liquid that is clear and colourless. It works as a binding, emulsion stabilizing agent, and solvent in cosmetics and personal care products. Because many PEG types are hydrophilic, they are favourably used as enhancers of penetration, and used heavily in topical dermatological preparations. PEGs, along with their many non-ionic derivatives, are widely utilized in cosmetic products as surfactants, emulsifiers, cleansing agents, humectants, and skin conditioners.

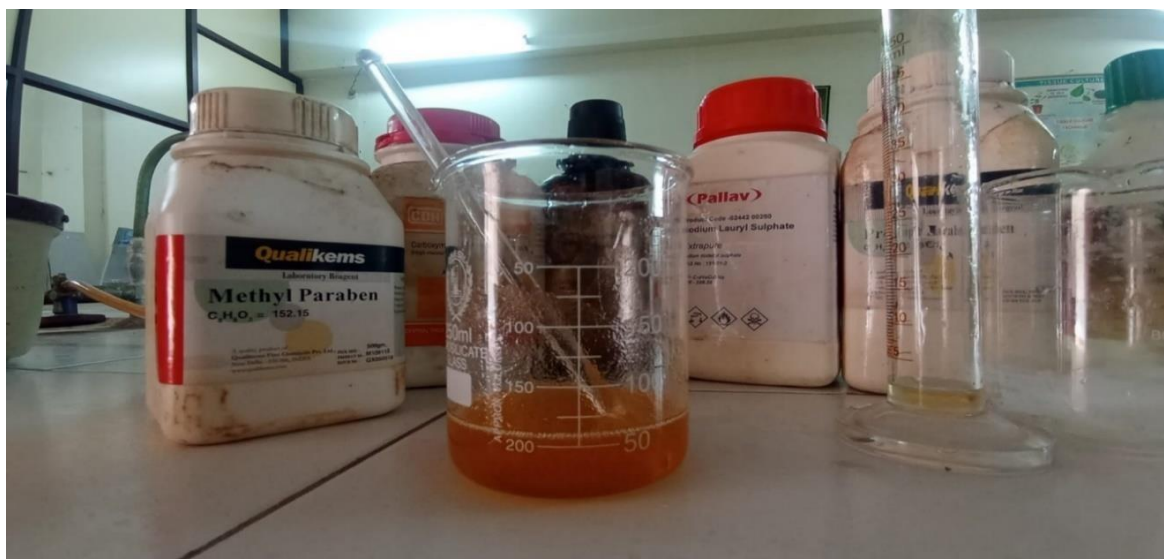


PREPARATION OF FACE WASH GEL



For the preparation of gel accurately weighed quantity of gelling agents were dissolved in water, and then triethanolamine was added drop by drop with constant stirring until PH is neutralized and gel is formed. Triethanolamine was added slowly to the dispersion with continuous stirring until a stiff gel was formed. Then

the measured quantity of carboxy methyl cellulose is added to gelling agent with continuous stirring for 30 mins. Glycerine (humectants) is added as moistening agent, Propyl paraben and methyl paraben (preservatives) were added in required quantities dissolved in water and added slowly with continuous stirring until a homogenous gel was formed, until a semisolid consistency was obtained. The consistency was checked every time to improve the viscosity of the preparation



FORMULATION -1

STEP-1 In this preparation we have to take the heating mantle and set the temperature.(70TEMP)

STEP-2 we have to keep the beaker on the heating mantle and add the weighed ingredients one by one.

STEP-3 After adding the ingredients & stir it continuously until the formation of gel.

FORMULATION -2

STEP-1 In this preparation we have to take the heating mantle and set the temperature.(70temp)

STEP-2 Add the different concentration of the weighed ingredients into the beaker.

STEP-3 After adding the ingredients & stir it continuously until the formation of gel

FORMULATION-3

STEP-1 In this preparation we have to take the heating mantle and set the temperature (70temp)STEP-2 Then add the different concentration of the weighed ingredients in to the beaker STEP-3 Then after adding the ingredients then stir continuously until the formation of gel.

TABLE-5 TABLE DESCRIBING ABOUT FORMULATIONS

SLNO	PEG 400	GLYCERINE	TRIETHANOLA MINE	METHLY PARABEN	PROPYL PARABEN	CMC	SLS	ORANGE PEEL EXTRACTION
F-1	10ML	5ML	5ML	1G	1G	1G	1.5G	5ML
F-2	40ML	10ML	10ML	1G	1G	1G	2.5G	5ML
F-3	35ML	15ML	15ML	1G	1G	1G	3G	5ML

EVALUTION TESTS FOR THE FACE WASH GEL:

Clarity test:

The clarity of formulation was determined by visual inspection under black and white background and it is graded as follows;

turbid: +, clear: ++, very clear(glassy): +++.

Slno	F -1	f-2	f-2
1	+++	+	++

TABLE -6

Measurement of pH:

The pH of various gel formulations was determined by using digital pH meter. One gram of gel was dissolved in 100 ml distilled water and stored for two hours. The measurement of pH of each formulation was done in triplicate and average values were calculated.



SLNO	FORMULATION -1	FORMULATION-2	FORMULATION-3
1	6.3	6.5	5.9

TABLE-7**Viscosity study:**

The measurement of viscosity of the prepared gel was done with a Brookfield Viscometer. The gels were rotated at 0.3, 0.6 and 1.5 rotations per minute. At each speed, the corresponding dial reading was noted. The viscosity of the gel was obtained by multiplication of the dial reading with factor given in the Brookfield Viscometer catalogues.



SLNO	FORMULATION-1	FORMULATION-2	FORMULATION-3
1	5826cps	5985cps	5999cps

TABLE-8**Spreadability:**

It indicates the extent of area to which gel readily spreads on application to skin or affected part. The therapeutic potency of a formulation also depends upon its spreading value. Spread ability is expressed in terms of time in seconds taken by two slides to slip off from gel which is placed in between the slides under the direction of certain load. Lesser the time taken for theseparation of two slides, better the spread ability. It

is calculated by using the formula $S = M. L / T$

Were,

S = Spreadability.

M = Weight tide to upper slide.

L = Length moved on the glass slide.

T = Time taken to separate the slide completely from each other

SLNO	FORMULATION-1	FORMULATION-2	FORMULATION-3
1	6.3cm	6.5cm	8.6cm

TABLE-9

Extrudability study:

After the gels were set in the container, the formulations were filled in the collapsible tubes. The extrudability of the formulation was determined in terms of weight in grams required to extrude a 0.5 cm. ribbon of gel in 10 second.

Homogeneity:

After the gels have been set in the container, all developed gels were tested for homogeneity by visual inspection. They were tested for their appearance and presence of any aggregates.

Grittiness:

All the formulations were evaluated microscopically for the presence of any appreciable particulate matter which was seen under light microscope. Hence obviously the gel preparation fulfils the requirement of freedom from particular matter and from grittiness as desired for any topical preparation

Characterization of gel

The prepared face wash gel was evaluated for various parameters.

Colour

The colour of the face wash gel was visually analyzed.

SLNO	FORMULATION-1	FORMULATION-2	FORMULATION-3
1	Amber	Extra light amber	Light amber

TABLE-10

Odour

The formulation was evaluated for its odour by smelling it.

Consistency

It was determined manually.

Washability

The product was applied on hand and was observed under running water.

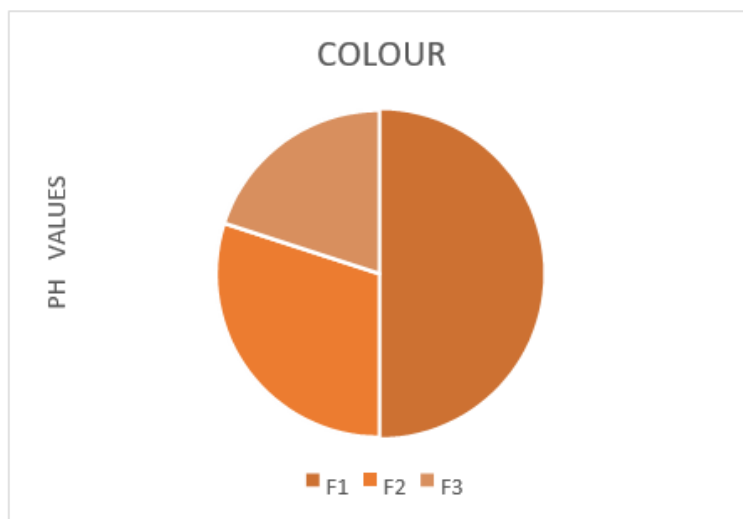
Foamability

Small amount of gel was taken in a beaker containing water. Initial volume was noted, beaker was shaken for 10 times and the final volume was noted. Foamability was also analysed by applying onto skin with contact with water.

RESULT AND DISCUSSION:

ORGANOLEPTIC CHARACTERISTICS:

The colour of the face wash was stable during the 2 weeks of observation. the storage condition which protected from light. Face wash amber. the colour of the formulation 1 was amber colour, the colour formulation 2 was extra light amber the colour formulation 3 was light amber colour.



HOMOGENEITY:

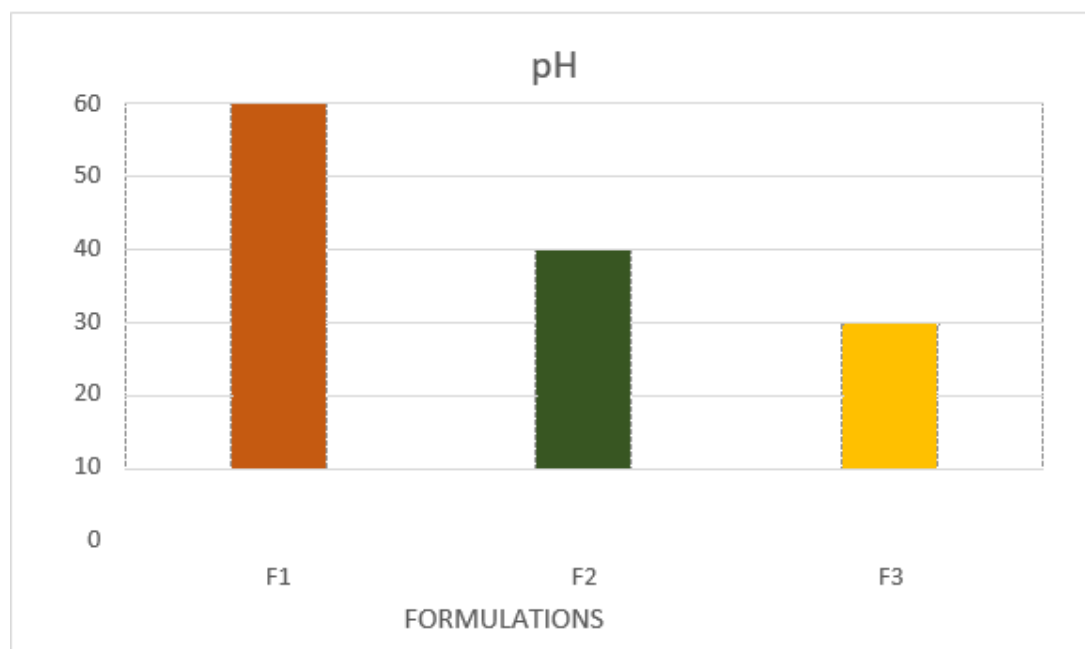
There was no clog in the face wash during the 2 weeks of observation. these results showed that the bases of face wash were homogeneous, due to prior grinding of the base materials

PRESENCE OF FOREIGN PARTICLES:

There were no foreign particles in the face wash during the 2 weeks of observation, due to usage of tightly closed container in which the preparation was stored.

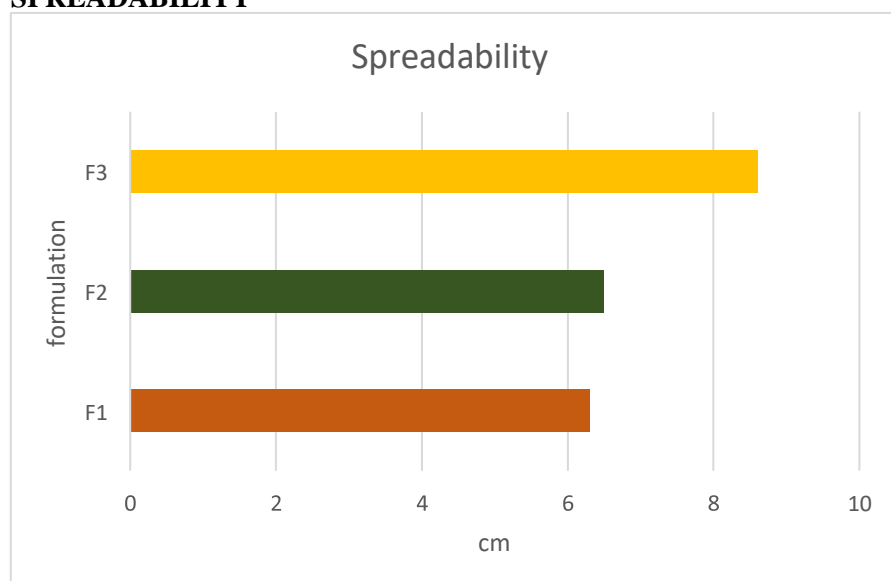
pH Evaluation:

There was no significant pH alteration in face wash. The pH value of face wash was ranging from 4.5 -7. The pH of normal skin varies, range from 4.5-6.5. The pH of formulation 1 was found to be 6.3 The pH of formulation 2 was found to be 6.5 the pH of formulation- 3 was 5.9



VISCOSITY:

The stability and application behaviour of face wash are important factors for subject acceptance. The viscosity of the face wash influenced by the ingredients and production process. the face wash viscosity of formulation 1 was 5826cps viscosity of formulation 2 was 5985cps viscosity of formulation 3 was 5999cps

SPREADABILITY**CONCLUSION**

- Orange peel extraction was entrapped in micro beads prepared with sodium alginate by the ionotropic gelation method using calcium chloride as a cross linking agent.
- The face wash gel was evaluated through foamability test, washability, viscosity & pH.
- As per the study we are concluding the prepared orange peel gel face wash with beads shows the exfoliating property & Anti acne property.
- Thus, the purpose of the investigation was successfully achieved.

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