

Formulation and Evaluation of Polyherbal Face Toner Containing *Chrysanthemum Indicum*

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ABSTRACT

In ancient times, people depended on naturally accessible resources to improve their appearance. Herbal cosmetic was utilized to impart beauty and were at first made from natural ingredient. These herbal cosmetics, also known as natural cosmetics, have gained popularity due to their lack of adverse effects. The early beginnings of herbal cosmetics can be traced back to ancient knowledge gathered through the Ayurvedic system. Ayurvedic cosmetics utilized herbs and plants to create effective beauty treatments, not only enhancing the skin's appearance but also protecting the body from environmental influences. Herbal toners are considered a natural and gentle option for various skin types. Herbal materials work harmoniously with the human body, providing essential nutrients and beneficial minerals without adverse effects. The study has aimed to developed an effective herbal toner using natural extract known for skin beneficial properties. Various formulation was created by combining the specific herbal extract. Parameter such as organoleptic property, Surface tension, Viscosity, pH, skin irritation, was assessed to determine the optimal formulation. Herbal toners in skincare includes benefits such as balancing the skin's pH, tightening pores, and providing a refreshing sensation. They are often used to remove traces of makeup and dirt, leaving the skin feeling rejuvenated. The result highlighted a promising formulation with notable skin friendly attributes, suggesting its potential as a natural alternative in the skin care industry.

Keywords: Toner, rejuvenation,

INTRODUCTION

In ancient times, people relied on naturally available resources to enhance their beauty. Cosmetics were used to impart beauty and were initially crafted from natural ingredients. However, with advancements in science over time, the introduction of various chemicals in cosmetic products became common, claiming to enhance beauty. While these chemical-based products may offer short-term beauty benefits, prolonged use has been associated with harmful effects on the skin.

As a response to the observed negative impacts, the cosmetics industry has shifted its focus to the development of herbal products. Today, herbal cosmetics continue to harness the power of medicinal plants, minerals, and organic materials in various traditional formulations. They encompass a wide array of products, including herbal conditioners, soaps, face washes, shampoos, and more. The beauty of herbal cosmetics lies in their composition, which comprises entirely of herbs and natural substances. ^[1] Herbal cosmetics are natural cosmetics that can be formed directly from fresh or dried fruits, flowers or plants. ^[2] Herbal cosmetics are the products derived from natural ingredients which are utilised in cosmetic preparations due to its minor side effects and easy accessibility. ^[3]

Cosmetics can be categorized into two groups: decorative and those enhancing skin functions. To understand this, let's briefly explore skin structure. Skin has layers, including the epidermis (Stratum germinativum, Malpighian, Stratum granulosum, Stratum lucidum, Stratum corneum), dermis and subcutaneous fatty tissue lies beneath it. It serves as protective barrier against various catastrophic substances. It also helps in maintaining the moisture loss.^[4] Different skin types require specific characteristics and suitable skin care: Normal skin: This type has an even tone, is soft, smooth, and lacks visible pores, greasy patches, or flaky areas. It appears clear, fine, supple, and neither oily nor dry. Suitable herbal care includes using pomegranate leaves juice and gingili oil, along with essential oils like chamomile, lavender, and lemon. Dry skin: It has a low level of sebum and is prone to sensitivity, giving it a parched look and a tight feeling. It may experience chapping and cracking due to dehydration. Herbal care for dry skin includes calendula, olive oil, and aloe vera, while essential oils like fennel, rose, almond, sandalwood, and avocado is beneficial. Oily skin: This type appears shiny, thick, and has a dull complexion with coarse pores, pimples, and other blemishes. It is prone to blackheads. Herbal care for oily skin involves using rose buds, oat straw, thyme, chamomile, aloe vera, and lemongrass, along with essential oils like juniper, lemon, lavender, and sage. Combination skin: Some areas of the face are dry or flaky, while the central part, including the nose, chin, and forehead, is oily. For combination skin, herbal care includes menthol, turmeric, sweet flag, and aloe vera, while essential oils like citrus oil, jasmine, and sandalwood oil can be used.^[1] Facial skin health is a part of alluring radiant for everyone.^[5] The fundamental facial skin care consists of three crucial steps: Cleansing: This step is vital to eliminate dirt, dead cells, and pollutants that clog pores and lead to skin issues. Herbal cleansers, like Aloe Vera combined with

glycerine or camphor, have deep cleansing properties, effectively removing makeup and impurities. Toning: Toners help tighten the skin and protect it from airborne toxins and pollutants. Grape seed oil and fresh lemon juice act as astringents, contributing to skin toning and tightening. Moisturizing: Moisturizers are essential for maintaining smooth, supple skin with a natural glow and reduced signs of aging. Ingredients like rose water, rose petal infusion, and violet, which is slightly astringent and moisturizing, refresh and hydrate the skin while also having anti-inflammatory properties to aid in healing cuts and wounds.^[1]

Herbal toner in cosmetics is a lotion or wash used to cleanse the skin, reduce the appearance of pores, and moisturize, protect, and refresh the face. There are various ways to apply toners, such as using a cotton round, spraying directly onto the face, or applying it with a tonic gauze facial mask.^[6]

Herbal toners serve different purposes. In earlier days toners were used as a cleansing agent afterwards a facial cleanser.^[7] But at present the herbal toners serves various purposes including removing residual makeup, preparing the skin before nourishing treatments, rehydrating, balancing skin pH, tightening pores, relieving irritation, and acting as an antiseptic. They are now used more as cosmeceutical products with multiple benefits for various skin types, like oily, sensitive, or combination skin.^[8]

The objective of the Face Toner is extraction of herbal materials, phytochemical analysis of extract, formulation of extracted flowers and evaluation of facial toner such as Organoleptic property, Surface tension, Viscosity, pH, skin irritation, microbial test etc.

The scope of herbal toners in skincare includes benefits such as balancing the skin's pH, tightening pores, and providing a refreshing sensation. They are often used to remove traces of makeup and dirt, leaving the skin feeling rejuvenated. Herbal toners

are considered a natural and gentle option for various skin types, but their effectiveness can vary based on the specific herbs and ingredients used. They can be part of a broader skincare routine, helping to prepare the skin for moisturizers and serums. However, individual results may vary, so it's essential to choose a toner that suits your skin type and concerned.

MATERIALS & METHODS

Material: All materials such as *Chrysanthemum indicum* and other ingredient was procured by local market of Bangalore.

Table no. 01: Material for polyherbal face toner

Sl. No.	Materials	Place
1.	<i>Chrysanthemum indicum</i>	Market
2.	Aloe vera	Market
3.	Glycerin	Market
4.	Rose water	Market

Chrysanthemum indicum also known as Chandra mallika (hindi), Sevantige

METHODOLOGY

Table no. 03: Formulation

Sl. No.	Ingredients	F1	F2	F3	F4
1.	<i>Chrysanthemum indicum</i> extract	2ml	14ml	6ml	10ml
2.	Aloe vera	15ml	10ml	12ml	09ml
3.	Glycerin	10ml	15ml	16ml	11ml
4.	Rose water	23ml	11ml	16ml	20ml

Method of preparation of polyherbal face toner

Preparation of *Chrysanthemum indicum* extract [9]

After being cleaned with distilled water, the flowers were left to dry in the shade for 4 to 6 days. After that, they were completely eradicated and coarsely pulverised by using distilled water for extraction. 420ml of distilled water in combination with 22.6g of dried *Chrysanthemum indicum* flower. After that, it underwent heating and simmered for an hour while being constantly stirred. The filtration procedure is completed and the filtrate containing the primary component is extracted after an hour.

(kannada) possess rejuvenating property in their long term use. It is used in the toner preparation for maintaining the skin's pH and for providing rejuvenated feeling. [9]

Aloe vera is known as a plant that has many benefits because all parts of this plant can be used both for body care and to treat various diseases. It has cooling effect as well as provides hydration to the skin. [10]

Glycerine is a transparent, colourless in nature, odour free, dense and water soluble liquid. Rose water is colourless, clear, strong, has pleasant odour and taste of fresh rose blossoms. [11]

Equipment

Table no. 02: Equipments used

Sl.no.	Equipment
1.	Weighing balance
2.	pH Meter
3.	Stalagmometer
4.	Digital water bath
5.	Ostwald's viscometer
6.	Hot air oven
7.	Incubator



Figure no. 01: *Chrysanthemum indicum* flower

Preparation of Aloe vera juice [12]

After using a spatula to remove the middle parenchymatous pulp from the aloe leaves, the pulp was repeatedly treated with water. To render juice, the rinsed pulp had been placed in a blender. The pure aloe vera gel was subjected to heating for 30 minutes at 70°C in a bath of heated water. The juice's darkening enzymes were eliminated by heat

treatment. To succeed in a clear liquid, the resultant juice was filtered by adding activated charcoal (0.1%) and going through Whatman filter paper.

Phytochemical evaluation of *Chrysanthemum indicum* flower extract [13]

1. Test for alkaloids
For 2 minutes, 2% H₂SO₄ was used to heat the floral extract. Alkaloids were found after filtering it and adding a few drops of the subsequent reagents after dividing the filtrate into 3 parts. Dragendroff's reagent: The test result was positive when a crimson precipitation appeared. Using Mayer's reagent, a creamy white hue signified a successful test. Picric acid: The test is acceptable when a yellow cloud forms.
2. Test for flavonoids
10ml of ethyl acetate and a little amount of extract were boiled in simmering water for 3 minutes. After filtering the mixture, the resultant filtrate was employed in the subsequent experiments. After mixing the filtrate, 1 ml of 1% dilute ammonia solution was added. The layers were permitted to drift apart. The ammonia layer had a yellow tint, which suggested the presence of flavonoids. After mixing the filtrate with 1 ml of 1% ammonium chloride solution, a pale-yellow hue was seen. It suggested that flavonoids were present
3. Test for carbohydrates
After giving the extract a good shake with water, it was strained. Molisch's reagent was incorporated in little drops to the aqueous filter, and it was gently shaken once more. 1 ml of concentrated H₂SO₄ was cautiously injected to create a layer beneath the aqueous solution. The positive test outcome was indicated via a brown ring at the interface.
4. Test for saponins
4 ml of distilled water were used to dilute a small number of various extracts. After giving the mixture a good shake, the mixture was shown to be standing for an unshakable brake, indicating a successful test.
5. Test for Steroid
The extracts were mixed with 2 ml each of H₂SO₄ and acetic anhydride. The presence of steroids was identified by the colour changing from violet to either blue or green.
6. Test for Anthraquinone glycoside test (also known as the Borntrager's test)
The extracts were combined with dil.H₂SO₄ and heated subsequently, chilled and screened. 3 ml of benzene were put in with the cool filtrate. After the benzene layer had been divided, a solution of ammonia (2 ml) was added. A positive test result was suggested by the observation of a rose pink to red hue in the ammonical layer.
7. Test for Legal's test which looks for cardiac glycosides
1 ml each of pyridine and sodium nitroprusside solution were added to each extract, and the results were noted. The observation of a rich red tint indicated a positive test result.
8. Test for Terpenoid (Salkowski test)
To create a layer, 3 ml of concentrated H₂SO₄ were added after each extract and 2 ml of chloroform were combined. A good result for the presence of terpenoids was shown by a reddish-brown hue at the contact.
9. Test for mucilage and gum
10 ml of distilled water were used to disperse each extract, and then 25 ml of pure alcohol were added while agitating continuously. Gum and mucilage's were indicated by a white or hazy precipitate.
10. Test for proteins and amino acids
After diluting the extract in 10 ml of distilled water, the filtrate's protein and amino acid content was examined.
 - a. Biuret test: 1 ml of 95% ethanol was added to 2 ml of filtrate after it had been treated with one drop of 2% copper sulphate solution. Sufficient potassium hydroxide pellets were then added. The presence of proteins was shown by the ethanolic layer's pink colour.

- b. Ninhydrin Test: 2 ml of aqueous filtrate was mixed with 2 drops of ninhydrin solution (10 mg of ninhydrin in 200 ml of acetone). Amino acids were denoted by a distinctive purple hue.

Table no. 04: Phytochemical screening results

Sl. No	Phytochemical constituents	Extract
1.	Carbohydrates	+ve
2.	Saponins	+ve
3.	Alkaloids	+ve
4.	Amino acids and proteins	-ve
5.	Gums and mucilage	-ve
6.	Terpenoids	+ve
7.	Flavonoids	+ve

‘+’ indicates presence, ‘-’ indicates absence

Preparation of polyherbal face toner:

The extracts and excipients needed for the formulation were first gathered. Next, the components were measured in a beaker using the prescribed formula. In the beaker, all of the ingredients were combined. After the homogenous mixture was created, the formulation was put into the spray bottle, and after a predetermined amount of time, the stability was to be assessed.

Container and Storage:

To be kept at room temperature in a spray container that is tightly closed.

How to utilise it:

1. Shake thoroughly before using.
2. After washing your face, mist it with toner.
3. Permit the spray to stay on your face for a while.
4. Use cotton or a gentle cloth to remove the toner.
5. Apply the toner twice daily for more effective skin- rejuvenating effects.

Evaluation of Face toner [4,9]

1. Organoleptic properties
The organoleptic characterization of herbal face toner, such as colour, odour and texture were investigated.
2. Homogeneity

Visual inspection was used to assess homogeneity for the presence of any clogs and their appearance.

3. pH assessment

Herbal toners are tested for pH to find out how acidic or alkaline they are. This information is crucial because it guarantees that the toner is in the proper pH range for the best possible skin health and efficacy. The calibrated pH metre was submerged in the 25 ml formulation for a certain amount of time before the measurement was taken, and the mixture was then transferred to a beaker with graduations.

4. Viscosity

The formulation's viscosity was measured using Ostwald's viscometer. Centipoise units were used to record the formulation's viscosity and that of the water.

5. Surface tension

They can determine whether the toner will distribute evenly throughout the skin or if it might form droplets or uneven spots. This knowledge is important for ensuring that the toner is used correctly, and that the user has a consistent experience. The stalagmometer collected the formulation and the surface tension was measured.

6. Skin conditioning

The skin appeared smooth, soft and moisturised after applying the toner.

7. Temperature variations, the formulation was exposed to different temperatures at room temperature (25°C), refrigerated (5°C), and oven temperature (45°C) over a 30-day to check stability.

8. Light exposure testing

To check for product discoloration the product is left in its actual packaging under direct sunlight for 48 hours.

STATISTICAL ANALYSIS

The herbal toner mean difference (Mean diff = -10.93 SD = 18.34, 95% CL (-56.49, 34.63)) was not statistically significant at the 0.05 level of significance (t = -1.032, DF

= 2, $P < 0.05$ (0.205), indicating that there was a significant difference between the formulas, according to the results of the pair sample T test. The low viscosity value of F1 formulations suggests that the preparation contains well-dispersed particles and generates an acceptable flow rate.

RESULT

1. Organoleptic test:

An organoleptic test was carried out by observing the preparation's colour, odour and texture. The results of the organoleptic test can be seen that the polyherbal face toner preparation is yellow. The odour in all polyherbal face toner formulas produces an aromatic smell. All polyherbal face toner formulas are smooth, non-sticky and are easy to absorb.

Table-05: Organoleptic test results

Formulas	Colour	Odour	Texture
F1	Faint yellow	Aromatic	Smooth
F2	Dark yellow	Aromatic	Smooth
F3	Faint yellow	Aromatic	Smooth
F4	Dark yellow	Aromatic	Smooth

2. Test for Homogeneity:

To find particles in the formula that were not evenly mixed, a homogeneity test was performed. The homogeneity of polyherbal face toner preparations is shown by the active ingredient and additives being mixed together in the toner preparation recipe. The outcomes demonstrated that no insoluble particles were produced by any of the polyherbal face toner recipes.

3. pH examination:

A pH metre was used to determine the face toner's pH made entirely of herbs. Since the pH of polyherbal face toner preparations that satisfy the guidelines falls between 4.5 and 6.5, the evaluation score is F1.

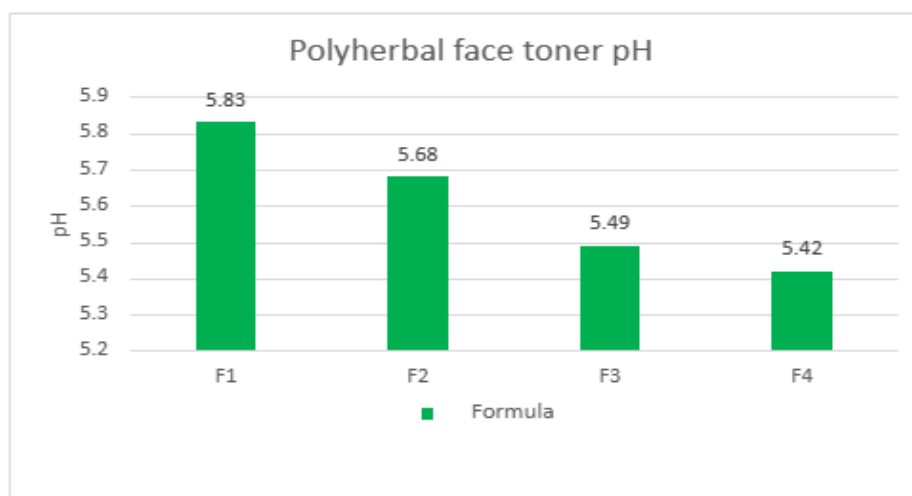


Figure no. 02

4. Viscosity Test:

An Ostwald's viscometer is used to measure the viscosity of polyherbal face toner solutions. The viscosity values for F1, F2, F3, and F4 were 2.12, 2.96, 2.96,

and 2.16 centipoises, respectively. The low viscosity values of all the formulas suggest that the preparations are well-dispersed and generate acceptable flow rates.

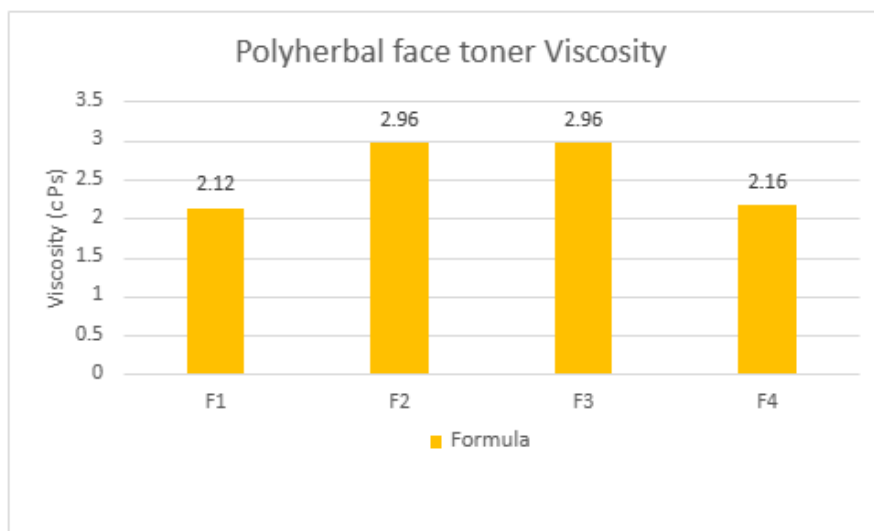


Figure no. 03

5. Tension Test on Surface:

Polyherbal face toner formulations' surface tension was measured with a stalagmometer. F1's surface tension

values were 65.29 dyne/cm, followed by 98 dyne/cm for F2, 82.83 dyne/cm for F3, and 85.8 dyne/cm for F4.

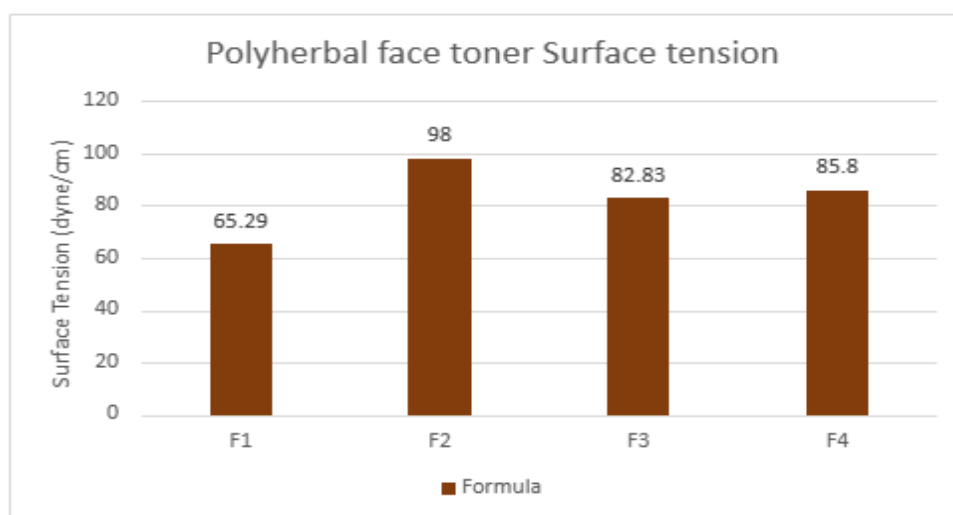


Figure no. 04

6. Physical evaluation:

a. Conditioning of the skin

Description: Skin look following toner application.

Result: The outcome was moisturized skin.

b. Testing for light exposure

Description: To check for discoloration, the product is exposed to direct sunshine in its container for 48 hours.

Result: No physical, chemical, or discoloration changes were noticed.

7. Analysis of Stability:

In order to ascertain if the product could retain its qualities throughout various temperature exposures at room temperature (25 °C), refrigerated (5 °C), and hot air oven temperature (45 °C) stability test was conducted. Following the setup, it was monitored for 30 days at these temperatures. Organoleptic testing, homogeneity tests, pH tests, viscosity tests, and surface tension tests were among the parameters that were tracked.

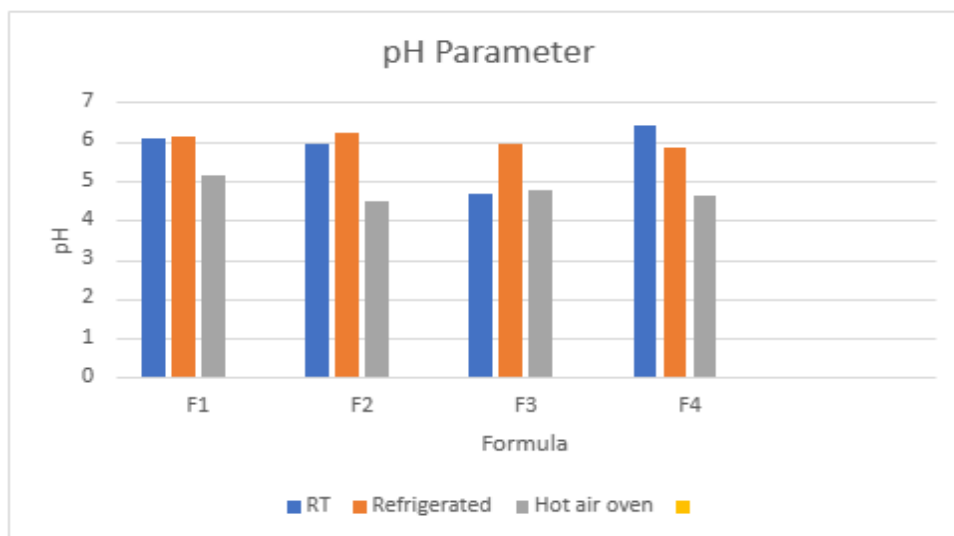


Figure no. 05: Results of pH, stability test at different temperatures

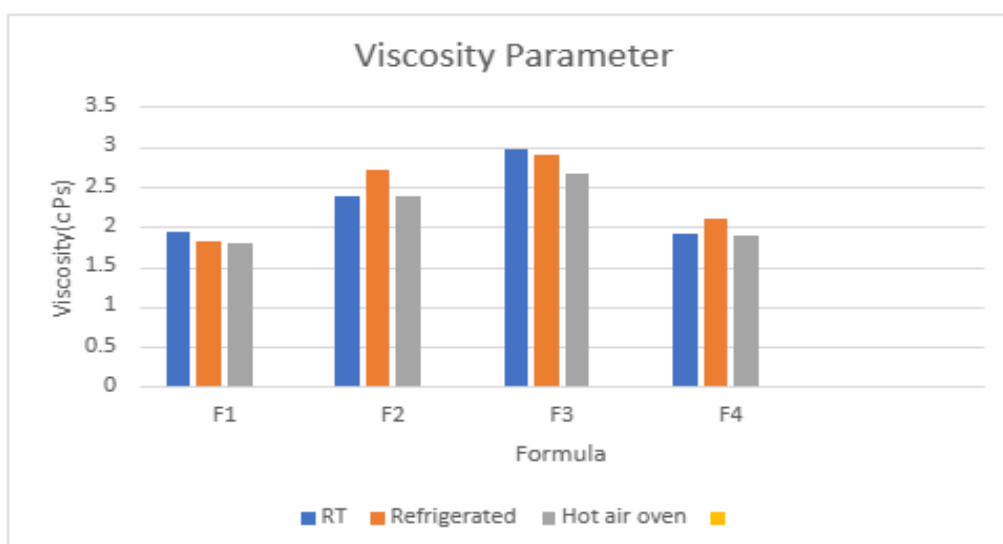


Figure no. 06: Results of viscosity, stability test

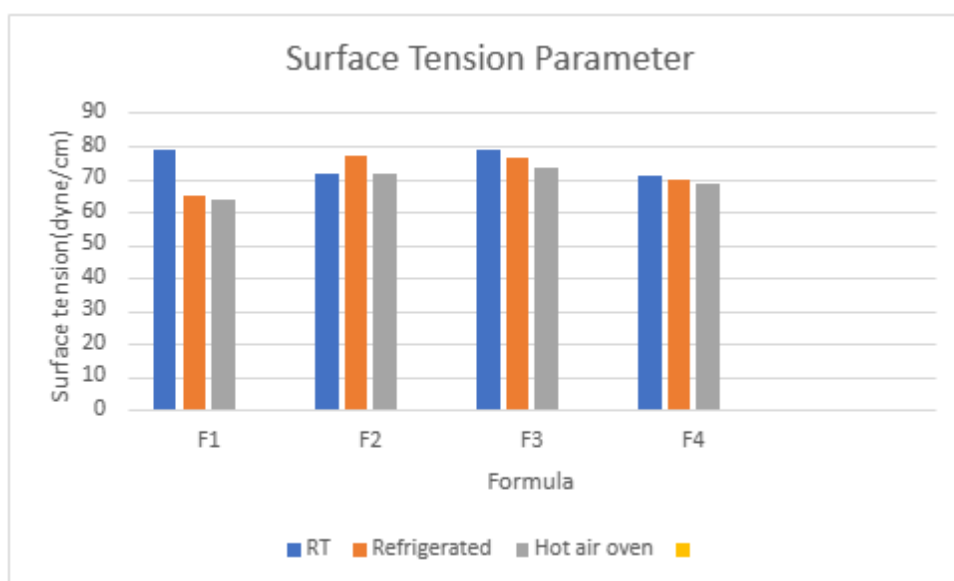


Figure no. 07: Results of surface tension

DISCUSSION

As was previously said, using herbal toners in skincare can have a number of advantages, including moisturizing skin, adjusting pH levels, shrinking pores, and giving skin a refreshing feeling. The creation and assessment of a polyherbal toner including *Chrysanthemum indicum* extract were completed in this study. Several formulations of the polyherbal toner have been produced independently for this research. Numerous evaluation experiments determined which of these compositions was the finest for the polyherbal toner. Cost-effective techniques were used in the laboratory for the formulation and evaluation. It was discovered that the components were entirely miscible with one another without creating an interface. The face toner formulation was created in accordance with Table 03, wherein the constituent amounts were progressively increased and decreased. The purpose of the evaluation experiments was to determine the formulated toner's physical parameters. In order to determine the medicinal and skin-care effects of *Chrysanthemum indicum* flower extract, a phytochemical study was also carried out on it. After conducting testing for pH, viscosity, surface tension, and stability, it was found that the face toner with formula code F1 performed better than the other three formulations. The formulation showed no signs of discoloration following exposure to light. Additionally, the formulation worked well to condition the skin.

CONCLUSION

The spray toner composition produced quite pleasing results. Research has shown that the poly herbal face toner, which is designed to shrink pores, hydrate skin, balance pH levels, and give skin a refreshing feeling, is beneficial. The following were the conclusions derived from the evaluation test: Organoleptic properties of the formulated face toner showed no immiscibility, or non-uniform distribution of colour. The pH test, viscosity test and

surface tension test provided the results that the formulation F1 showed the values within range as compared to other three formulations i.e., F2, F3 and F4 which showed values that are higher than the standard range respectively. The physical evaluation of the formulation suggested that there was no discoloration in the formulation after being exposed to direct sunlight. The stability test provided the results that the formulation F1 was more stable when stored at different temperatures than F2, F3 and F4 formulations. Thus, to conclude, the formulation F1 showed desirable results and was considered to be the best formulation than the other three formulations i.e., F2, F3 and F4.

Declaration by Authors

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