

MEDICATED HERBAL SHAMPOO FOR COLORED HAIR EFFECT OF ARGAN OIL

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Abstract

the objective of this study is to produce innovative medicated herbal shampoo for colored hair that moisturize dried colored hair, prevent colored hair loss, increase colored hair growth, prevent damaged of colored hair and enhance presence of dye hair for longer time, medical herbs as roselle extract, henna extract ,green tea extract, argan oil, and olive oil, are used in our study, the formulation of many experiments need exact concentrations of the ingredients of formula by heating texapon and water at 70 ° and addition herbal extracts with mixing , then addition preservatives and fragrance at 50 °, after getting the good physical properties and good feedback by using 25 volunteers for the formula and using hair analyzer device, in this research laboratory testing on the final formula is done by getting viscosity using viscometer, PH using PH meter, microbiology tests, dirt dispersion , surface tension by capillary rise method, foam ability and foam stability by using pigments, solid contents using human manual testing, the final formula has good and suitable results for PH, viscosity, dirt dispersion, surface tension and foam stability 46 experiments was done to improve medicated herbal shampoo for colored hair with herbal extracts as argan oil .the problem of study how fix color of dyes on hair for long time , many studies were made before about this subject but in this study concentraton is on argan oil and effect of this oil on colored hair

the final formula has good results as moisturizer for colored hair, improve colored hair growth and reduce hair loss, it is creamy with beautiful odor and smooth texture, these results are gotten by trained volunteers according to sensorial form is done, these results taken by trainers, sensorial forms used to get these results.

Key word : Argan oil , shampoo, medicated . colored hair

ntroduction

We find Many studies talk about evaluation and formulation of herbal shampoo, and it studies many herbs from many countries, testing are done by volunteers and other testing are done chemically and biologically and physically and little researchers work on structure composition for human hair on other hand little researchers talk about ingredients of hair dyes and effect on colored hair loss and protection of colored hair

Protection of Colored Hair

Talking about a composition for protecting hair from damage caused by exposure to ultraviolet light and a method of using the composition. The composition¹

comprises:

(a) a first component selected from the group consisting of a material having superoxide dismutase activity, ascorbic acid, Cytochrome C, mixtures of nicotinamide dehydrogenase and lactate dehydrogenase, uric acid, uric acid salts,

(b) a second component selected from the group consisting of mannitol, catalase,

(c) a third component selected from the group consisting of a disulfide, a thiol, and,

disulfide and said thiol each having a molecular. weight of at least about 100.

At the same say that some Sunscreen composition for protecting hair are ² a Sunscreen agent, a cinnamido alkyl amine cationic quaternary Salt, a Solvent a film former; a pH adjuster, and water talk about green tea as tonic for hair ³.

Green tea has cosmetic benefits that include activities against androgen disorders. A hair tonic containing green tea for reduction of scalp sebum was developed and clinically evaluated. Stable green tea hair tonics were closed-patch tested and clinically evaluated in 20 volunteers for 28 days by using a Submeter. Hair tonic base with glycerin and butylene glycol (total 4%) gained the highest consumers'

¹ *Walter P. Smith.,etal., 1988*

² *James SaNogueira ., etal., 2001*

³ *chanchanok nualsri.,etal.,2016*

preference was incorporated with green tea extract. All of the products were stable and none caused skin irritation. Green tea 0.024% lowered scalp sebum for 21 and 28 days following the application, hair tonic (2%) significantly (p < 0.05) suggesting that this topical therapy of scalp greasiness is safe and efficient.

Improve Colored Hair Growth

Hair tonic and conditioner formulations containing herbal extracts, such as fenugreek, can prevent hair loss and retain hair conditioning. First of all, the proved seeds of fenugreek were extracted with 50% ethanol by maceration method, and then were freeze dried and stored in the fridge.¹

After preparing the formulation, some physicochemical properties such as pH, foam formation, viscosity, conditioning and wettability were evaluated. The pH of the formulated shampoo was determined. The results of its showed good thixotropy property. High foam production and stability were observed; this may be due to the existence of saponin in fenugreek seeds extract. On the basis of wettability and conditioning results, formulated shampoo can represent an attractive and suitable product. The pH of the formulated shampoo was in the standard range of 6 to 8. The formulated shampoo has also shown the better foaming productivity and thixotropic properties which shows its suitable viscosity. The wetting effect of shampoo was taken 5 min which indicates its proper quality in comparison to some other shampoos in the market. Based on the wettability and conditioning data, it can be concluded that the formulated shampoo has a good quality of introducing it to the market.

Medical Herbs for Fixing Hair Colors

Talk about using medical henna herbs as growth hair potential It has been observed that a number of herbs and their extract are used for hair growth activities some are described as follow: Petroleum ether extract of aerial parts of *Tridax procumbens* showed luxurious growth of hair in albino rats. Nearly 70% ethanolic extract of leaves of *Ginko biloba* was shown to be effective for hair growth activity. Methanolic extract of *Potyporus umbellatus* has shown excellent hair growth activity in rats. Combined extract *Emblica officinalis*, *Lawsonia inermis*,

¹ *Gholamreza Dehghan Noudeh., et al., 2011*

Nardostachys jatamansi, Cyperus rotundus and Corchorus prevent the falling of hairs and enhancement of hair growth activity. Proanthocyanidins from grape seeds promote the proliferation of mouse hair follicle cell in vitro and convert hair cycle in vivo similar¹ to Minoxidil 2% solution which is synthetic and has numbers of side effect. Herbal cosmetics are in vogue these days. Nowadays, people have become aware of using herbal Henna, lawsonia inermis, is a plant. It is a large bush, or small tree, that grows in hot, dry climates. There is evidence from Egypt that henna was regularly used to dye hair five thousand years ago, and may have been used in Jericho as early as eight thousand years ago. Henna was used to keep hair healthy and to color gray hair. cosmetics. In similar⁶ talk about henna as good natural dye on hair, Henna, lawsonia inermis, is a plant. It is a large bush, or small tree, that grows in hot, dry climates. There is evidence from Egypt that henna was regularly used to dye hair five thousand years ago, and may have been used in Jericho as early as eight thousand years ago. Henna was used to keep hair healthy and to color gray hair.²

A dye is a substance which is used for coloration. Dyes have been in use for ages, nowadays there are several kinds of dyes used in printing, textiles, food, leather and paints industries. They are also used in Histopathology and cytological examination. This study aims at demonstrating specific component of the cells that will be useful in diagnosis. Solution 1 stains Nuclei– dark blue to black, Cytoplasm stains dark brown to pink fibres–dark brown. The structures were weakly demonstrated by Roselle solution 1. Solution 2 stains Nuclei–dark blue to brown, Cytoplasm–golden brown, RBC–brown, Collagen fibres–golden brown.³

There was good demonstration of those structures. Roselle Solution 3 stains Nuclei–red, Cytoplasm–golden yellow, RBC–brown, Collagen fibres–pale blue. There was optimal demonstration of those structures. Roselle solution 4 stains Nuclei–red, Cytoplasm–golden yellow, RBC–brown, Collagen fibres–golden yellow, Roselle solution 5 stains Nuclei–blue Cytoplasm–pink. It gives the same color as haematoxyl in and eosin technique. Buccal smear and blood smear stains

¹ Pushpindra kumar jain ., etal ., 2016

² Catherine Cartwright-Jones.,etal 2006

³ Omorodion.,etal.,2017

with Roselle plant extract and eosin Nuclei–Blue, Cytoplasm–pink, Barr body– not seen. Conclusively, Roselle plant has the ability to stain tissue sections and staining intensity depends on the type of mordant used Argan oil (*Argania spinosa* kernel oil) acts as an essential lipid–replenishing agent, protective emollient, and color–preserving agent when incorporated into herbal shampoos formulated for color–treated hair.

Argan oil (*Argania spinosa* kernel oil) acts as an essential lipid–replenishing agent, protective emollient, and color–preserving agent when incorporated into herbal shampoos formulated for color–treated hair. argan oil s found in may types in Morocco especially in sos area

Effects of Argan Oil on Color–Treated Hair

- **Lipid Layer Replenishment:** Chemical coloring strips the hydrophobic F–layer (18–methyleicosanoic acid) of the hair shaft. Argan oil is rich in essential fatty acids—primarily oleic acid (~43%) and linoleic acid (~36%)—which fill structural voids in porous, dyed fibers.
- **Cuticle Sealing & Color Retention:** By smoothing and laying flat lifted cuticle scales, argan oil creates a hydrophobic barrier. This reduces water penetration during washing, slowing down the leaching of water–soluble dye molecules and reducing color fading.
- **Antioxidant Protection against Photodegradation:** Rich in α –tocopherol (Vitamin E) and polyphenols, argan oil neutralizes reactive oxygen species (ROS) triggered by UV radiation and ambient pollution. This prevents photo–oxidation of artificial hair pigments and structural hair proteins.
- **Reduction of Wash–Induced Protein Loss & Friction:** Hydrophobic lipid film formation minimizes hair shaft swelling (hygral fatigue) and reduces inter–strand friction during lathering and combing.

Mechanism	Primary Components Involved	Benefit to Dyed Hair
Barrier Formation	Oleic & Linoleic Acids	Locks in moisture, prevents porosity-induced color runoff
Photo-Protection	Tocopherols (Vitamin E), Phenols	Guards against dye degradation caused by UV exposure , protect hair from UV
Surface Smoothness	Squalene, Phytosterols	Restores light reflection (shine) to chemically dulled cuticles

Dyes Used for Colored Hair

Study of PPD Many women and men now dye their hair. p-Phenylenediamine (PPD) is a frequent and important component of permanent hair dye products; exposure to it may cause allergic contact sensitization, acute dermatitis, and severe facial oedema. To increase our understanding of PPD allergy, we reviewed published literature containing PPD patch test data from dermatitis patients and individuals in the general population. This was performed to estimate the median prevalence and the weighted average of PPD sensitization and thereby assess the burden of PPD-containing hair care products on health. Literature was examined using PubMed–MEDLINE, Biosis, and Science Citation Index. The median prevalence among dermatitis patients was 4.3% in Asia, 4% in Europe, and 6.2% in North America. A widespread increase in the prevalence of PPD sensitization was observed among Asian dermatitis patients. In Europe, a decrease in the 1970s was replaced by a plateau with steady, high prevalences ranging between 2% and 6%. The prevalence remained high in North America, although a decreasing tendency was observed. In the similar⁹ Organic compounds present in plants have been used in various experimental conditions for dyeing tests aimed to develop safe and ¹

environmentally friendly temporary and semipermanent hair dyes. Yak hairs were used as a model for the colorimetric evaluation of red, yellow, blue, and brown shades conferred to hair by selected natural compounds. Two different sources for red, yellow, blue and brown shades were tested. Anthocyanins from

¹ Jacob Pontoppidan thyssen.,etal.,2008

mulberry fruits and alizarin emerged as promising candidates for red shades, anthocyanin–blue and curcumin for blue and yellow, respectively, and p–benzoquinone and juglone for browns. The influence of pH, dye concentration, soaking time, and medium in which the dyes have been dissolved or dispersed has been studied.¹ Describes an approach to hair coloration which is different from any currently available system. It is based on formation within the hair of deposits of a melanin pigment, very similar in character to that responsible for the color of natural hair. The hair coloring process consists of two steps: a shampoo during which a dye initiator (Cu II) is introduced into the hair structure and, following a rinse, treatment with an aqueous solution of a colorless melanin precursor, 5,6–dihydroxindole. The coloring process is usually complete within five to ten minutes. The melanin deposits are formed in the peripheral regions of hair and thus are readily available for color modification or even total removal.²

Effective of Shampoo and Dyes on Colored Hair Focille

Talk about relation between hair dyes and hair loss³

They report the case of a 41–year–old female showing severe hair loss approximately 90% after the use of a hair dye. These symptoms developed six days after the use of a hair dye containing PPD. A patch test showed a (++) reaction at 48 h to 1% PPD in petrolatum, whereas all metals and white petrolatum were negative. She was therefore diagnosed with contact dermatitis due to PPD, resulting in hair loss. The skin lesions gradually improved after starting treatment with the systemic corticosteroids. The possibility that allergic contact dermatitis from hair dyes may be responsible for telogen effluvium should always be considered in a patient with increased hair loss. On other hand on other hand (*Yuchen Zhang, et al.*, 2015)¹² talk about Effect of shampoo, conditioner and permanent waving on the molecular structure of human hair, The hair is a filamentous biomaterial consisting of the cuticle, the cortex and the medulla, all held together by the cell membrane complex. The cortex mostly consists of helical keratin proteins that spiral together to form coiled–coil dimers, intermediate filaments, micro–fibrils and

¹ *CarlaBoga, et al.*, 2013

² *Ailthough K. BROWN, et al.*, 1989

³ *Waka Ishida. et al* 2011

macro-fibrils. We used X-ray diffraction to study hair structure on the molecular level, at length scales between $\sim 3\text{--}90$ Å, in hopes of ¹ developing a diagnostic method for diseases affecting hair structure allowing for fast and noninvasive screening. However, such an approach can only be successful if common hair treatments do not affect molecular hair structure. We found that a single use of shampoo and conditioner has no effect on packing of keratin molecules, structure of the intermediate filaments or internal lipid composition of the membrane complex. Permanent waving treatments are known to break and reform disulfide linkages in the hair. Single application of a perming product was found to deeply penetrate the hair and reduce the number of keratin coiled-coils and change the structure of the intermediate filaments. Signals related to the coiled-coil structure of the α -keratin molecules at 5 and 9.5 Å were found to be decreased while a signal associated with the organization of the intermediate filaments at 47 Å was significantly elevated in permed hair. Both these observations are related to breaking of the bonds between two coiled-coil keratin dimers.

Evaluation of Herbal Shampoo

Formulate a pure herbal shampoo and to evaluate and compare its physicochemical properties with the marketed synthetic and herbal shampoos. The herbal shampoo was formulated by adding the extracts of *Acacia concinna*, *Sapindus mukorossi*, *Phyllanthus emblica*, *Ziziphus spina-christi* and *Citrus aurantifolia* in different proportions to a 10% aqueous gelatin solution. Small amount of methyl paraben was added as a preservative and pH was adjusted with citric acid by PH meter. Several tests such as visual inspection, wetting time, % of solid contents, foam volume and stability, surface tension, detergency, dirt dispersion etc by human, were performed to determine the physicochemical properties of both prepared and marketed shampoos. The formulated herbal shampoo was also evaluated for conditioning performance by administering a blind test to 20 student volunteers. The formulated herbal shampoo was clear and appealing. It showed good cleansing and detergency, low surface tension, small bubble size and good foam stability after 5 min²

¹ Yuchen Zhang., *etal.*, 2015

² Khaloud Al Badi ., *etal.* , 2014

In the similar say that *Allium sativum*, family Alliaceae possess antioxidant, antimicrobial, antitumour, antimutagenic, anti-inflammatory, antiviral and antiulcer properties. The aim of this study was to take ¹ the benefit of the nature of *A. sativum* extract and prepare shampoo incorporating in the herbal constituent base and evaluate this natural herbal shampoo. The herbal shampoo formulations comprising of aqueous extract of *Allium sativum* (5% to 30% w/w), coconut oil, castor oil, olive oil, fragrance were prepared and evaluated for physicochemical parameters and the results showed the production of stable herbal shampoos. The pH (6.22 ± 0.01 to 5.01 ± 0.02), percentage of solids (23.21 ± 0.02 to 25.41 ± 0.04)

Selection of *Ziziphus spina crist* (*Z. spina crist*) leaves extract was based on its particular properties such as antimicrobial and detergent activities. This study aimed to formulate a self-preserving shampoo having low concentration of the detergent using *Ziziphus spina crist* leaves with emphasis on safety and efficacy;. Formulation of three investigated shampoos was prepared containing different amounts of *Ziziphus spina crist* extract and sodium laureth sulfate as a surfactant. Evaluation of organoleptic, physicochemical and performance tests were performed and compared with herbal marketed product (Cedr shampoo® , Sehat Company, Iran). ² The results indicated that F2 and F3 produced clear shampoos and their averaged pH values were in the range of 5.59–6.25 which were suitable to retain the acidic mantle of scalp. They provided stable foam, surface tension reduction, good cleaning and wetting effect and have pseudo plastic rheological behavior. Moreover, the aesthetic attributes, such as lather and clarity were comparable with the marketed shampoos. The foam volume was on a par and formulas showed higher detergency and foaming effects than the commercial herbal one ($p < 0.05$).³ Moreover they can be considered safe to children since less chemical contents were used and no side effects observed after application. *in the* ¹⁶ they have evaluated and compared the herbal shampoo, which was formulated in previous study, with two marketed shampoos. The findings of this investigation reveal that synthetic preservatives have sometimes been the cause of adverse effects among consumers.

¹ Swarnlata Saraf, et al., 2011

² Ali Heyam Saad.etal., 2011

³ Similar Ashok Kumar., et al., 2010

We have used the physico-chemical approach to preservation and by formulating a self-preserving shampoo, have avoided this risk posed by chemical preservatives. However, the aesthetic attributes, such as lather and clarity, of the laboratory shampoo are not comparable with the marketed shampoos. The foam volume was on a par. Although the retail products were not fare so well in the tests conducted by us, they enjoy market popularity, especially if they foam well. This is mainly due to the false notion among consumers that ‘a shampoo that foams well, works well’, and no real effort on the part of manufacturers to counter this fallacy in the same time have used the physico-chemical approach to preservation and by formulating a self-preserving shampoo, have avoided this risk posed by chemical preservatives. However, the aesthetic attributes, such as lather and clarity, of the laboratory shampoo are not comparable with the marketed shampoos. The foam volume was on a par. Although the retail products were not fare so well in the tests conducted by us, they enjoy market popularity, especially if they foam well. This is mainly due to the false notion among consumers that ‘a shampoo that foams well, works well’, and no real effort on the part of manufacturers to counter this fallacy.¹

At the same time study elimination of these materials from shampoo formulations. *Acanthophyllum squarrosum* is one of the 23 species of the genus *Acanthophyllum* endemic in Iran. Due to the presence of saponin in its root, chubak, has been used traditionally as a detergent. In this study, total saponins of *Acanthophyllum squarrosum* roots were extracted, using several solvents. A clear liquid shampoo base was formulated using Texapon as surfactant, sodium chloride as thickener, glycerin as viscosity modifier, methyl paraben as preservative and EDTA as sequestering agent.² Then, a fixed amount of Texapon was substituted by 1, 2.5 and 5 percent of total herbal saponins. Foaming ability of the shampoos prepared was evaluated by the Ross-Miles method and the cleansing power by Thompson test. The best result was found with the formula containing 20% Texapon and 5% total herbal saponins. Therefore, this formulation was selected as the best formula and evaluated for other characteristics. In addition to possessing the properties of a liquid shampoo, the unique characteristics of the formula containing

¹ Prabhat Dessai.,etal.,2016

² Nasrin Aghel.,etal 2017

5% total herbal saponins was that it produced a stable foam without the use of foam stabilizers. Evaluation of the cleansing power by Thompson test showed that the final formula is a shampoo for normal hair, with very good cleansing ability. Rheological studies showed that the final formula had a pseudoplastic behavior. Organoleptic and physicochemical characteristics of the final formula were all found to be acceptable.

Work on formulating and evaluating a complete herbal shampoo containing only traditionally used plant materials. The shampoo contained extracts of Hibiscus rosa-sinensis, Azadirachta indica, Trigonella foenum-graecum, Phyllanthus emblica, Sapindus mukorossi, Acacia concinna and fresh juice of Aloe vera. The physicochemical parameters such as colour, clarity, pH, skin irritation, percentage of solid contents, dirt dispersion, foaming ability and foam stability, wetting time and conditioning performance were studied using recommended procedures the pH meter and human testing are used respectively. The shampoo revealed ideal characteristics of a shampoo with¹excellent conditioning performance. The shampoo was devoid of any harmful chemicals and can be used as an alternative to its synthetic counterpart

in the same time Pooja S. Banerjee., et al., 2009 involves preparation of herbal hair oil using amla, hibiscus, brahmi, methi and its evaluation for increase in hair growth activity. Each drug was tested for their hair growth activity in a concentration range for 1–10% separately. Based on these results mixture of crude drugs fruits of Embelica officinalis, flowers of Hibiscus rosa sinensis, leaves of Bacopa monnieri and seeds of Trigonella foenumgraecum were prepared in varying concentration in the form of herbal hair oil by three different oils preparation techniques (direct boiling, paste and cloth method) and were tested for hair growth activity. The oil of different concentrations were characterized for proximate analysis, Excellent results of hair growth were seen in formulation prepared by boiling method of oils preparation technique including moisture content dispersion, surface tension (37.25 ± 0.45 to 39.87 ± 0.15), viscosity (6.5 ± 0.2 to 5.4 ± 0.2), skin irritation test (irritation) and visual stability. Formulations were

¹ Gouri Kumar Dash., et al., 2017

clear, had good foam formation, foam quality and retention with proper rheological properties and skin compliances.

Methodology

Method of Formulation of Shampoo

medicated herbal shampoo, 14% texapon, 14% starch, 1.5% olive oil, 1.5% henna extract, 3% sodium hydroxide, 3% roselle extract, 3% green tea, 1.5% nicadol, 0.5% methyl paraben, 0.5% fragrance, 57.5% water are weighted by electric balancer, then dissolve texapon with water smoothly by heating and stirring at 70 add salt gradually with stirring when temp is 50⁰, add nicadol with mixing then add color, fragrance and preservatives when temp is 40⁰

Dissolve starch with cold water procedure of processing of formulated medicated herbal shampoo

- 1- Weighing materials by balancers
- 2- Heating texapon + water @ 70 c⁰
- 3- Addition herbal extracts with gentle stirring then add salt solution
- 4- At 50 c⁰ add nicadol with mix
- 5- @ 40 c⁰ addition of preservatives and additives with mixing

Evaluation of Physical Properties

Physical properties as texture, smoothness, odor, color is measured by sensorial form that is worked by trainers as follows

Sensory analysis of physical properties for medicated herbal shampoo for colored hair (form 1)										
Smoothy:										
– roughness										
+ smoothness										
0 smooth										
5	4	3	2	1	0	1	2	3	4	5
Odor:										
– no odor										
0 Normal odor										

+ strong odor

5 4 3 2 1 0 1 2 3 4 5

Color

- No clear

0 normal color

+ strong color

1 5 4 3 2 0 1 2 3 4 5

Pearling

- No pearling

0 Normal pearling

+ strong pearling

5 4 3 2 1 0 1 2 3 4 5

Name of tester

Sample code

Date

Comments

Evaluation of Chemical Properties

Determination of Ph

A 10% v/v, shampoo solution was put in distilled water and the pH of the solution was measured by using a calibrated pH meter

Skin Irritation Test

A 1% v/v shampoo solution was put in distilled water and applied over the skin. The application was allowed to remain in contact for 2 h. (Gouri Kumar Dash.,etal., 2017)

Determination of % of Solid Contents

Percentage of solid contents in the shampoo was measured by taking 4 g of shampoo in a pre-weighed porcelain dish. The liquid portions were completely evaporated and the solids left after evaporation was weighed. (Gouri Kumar Dash.,etal., 2017)

The results were expressed as percentage weight of solid contents in the shampoo for formula 43

Wt of beaker =19.44 g

Wt of shampoo+ beaker = 23.44

Wt beaker after heating = 22.6

Wt solid = 0.84 g

% solid = $0.84/4 = 21\%$

Dirt Dispersion Test

2 drops of shampoo were mixed with 10 ml of distilled water in a test tube. To this solution, one drop of pigment (water soluble dye) was added and the contents in the test tube was shaken for ten times. The amount of pigment in the foam was indicated by the employing the rubric such as None, Light, Moderate and Heavy respectively (Gouri Kumar Dash.,etal., 2017)

Foaming Ability and Foam Stability

Foaming ability was determined by shaking 20 ml of 1% formulated shampoo solution for 10 times in a test tube. The total volume of the foam content determined on 1 min, 2 min 3, min and 4 min then recorded. (Gouri Kumar Dash., et al., 2017)

Wetting Time Test

A filter paper was taken. The smooth surface of disc was placed on the surface of 1% v/v, (2 ml) shampoo solution and the stopwatch started. Then time required for the filter paper to begin sinking was recorded as the wetting time. (Gouri Kumar Dash., et al., 2017)

Rheological Evaluations

The viscosity of the shampoos was determined by using mettler rm 180 rheometer.

Surface Tension Measurement

Measurements were carried out with a 10% shampoo dilution in distilled water at, capillary rise method is used.

The data calculated by following equation given below:

$S = \rho hga/2$ where S is the surface tension, ρ (or rho) is the density of the liquid you are measuring, h is the height the liquid rises in the tube, g is the acceleration due to gravity acting on the liquid (9.8 m/s^2) and a is the radius of the capillary rise method tube

Solution:

$$P = 0.94 \text{ g/cm}^3$$

$$h = 0.5 \text{ cm}$$

$$a = 0.75 \text{ cm}$$

$$s = (0.94 \times 0.5 \times 0.75 \times 9.8 \times 10^2) / 2 = 172 \text{ g/s}^2 \text{ (J/cm}^2\text{)}$$

Evaluation of Microbs

Different microbial tests should be worked to avoid contamination in shampoo standard tests are decided by PSI-part 2015-3100 as *Pseudomonas aeruginosa*, *Staphylococcus aureus*, Total aerobic count, yeast & molds,

General Instructions

The anti-microbial effects of the formulated shampoo were evaluated using anti-microbial test.

The work in distance in range 12-25 cm

Medis is dissolved by heating because it was prepared

Alcohol 70% is used to clean the work place; 3 plates are used because 3 dilution is done

On plate data are written as, name of sample, type of test, date of test

Pepton water 90 g is put in autoclave

10 gr pepton water is taken then dilution prepared as in figure below

Then plates *Pseudomonas aeruginosa* and *Staphylococcus aureus*, Total aerobic count tests leaved for 48 h in 37⁰, molds and yeast leaved plates leaved for molds and yeast 5 days at 30⁰ (SGM .2006)³⁶,³⁷

Microbial Testing

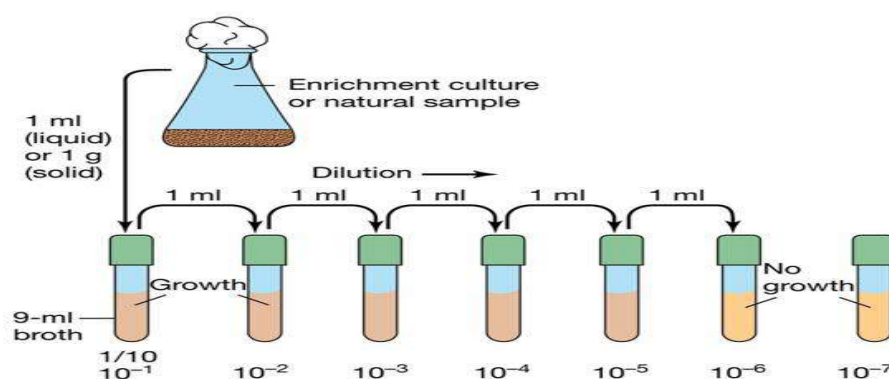
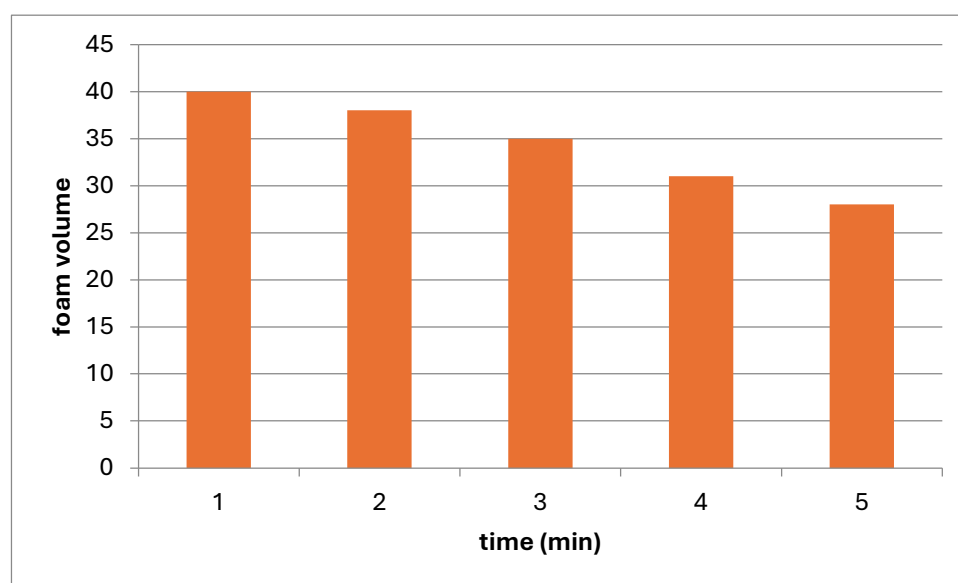
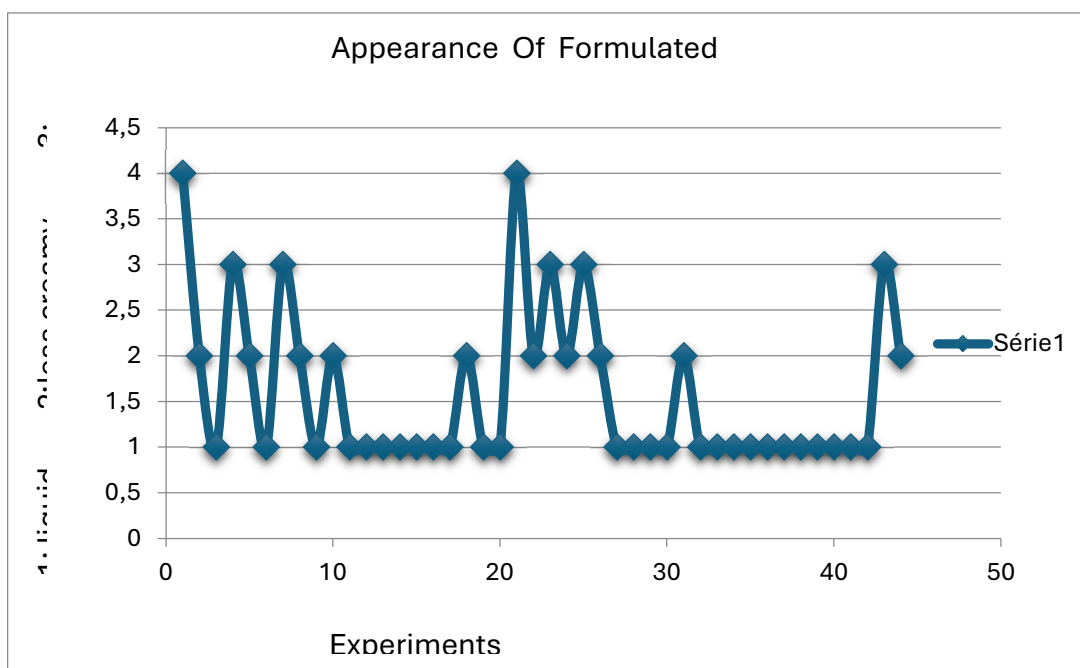
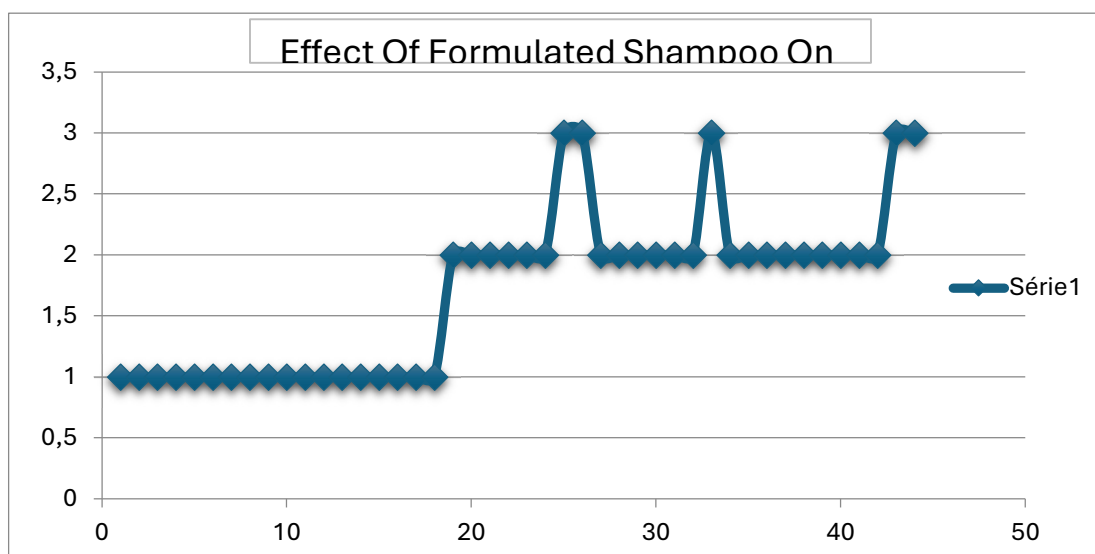


Figure show procedure of microbial testing



Foam retention profile of shampoo formula



Results of Microbial Test

Microbial test	Microbial count (CFU)		
	At 0 time	At 3 months	At 6 months
Pseudomonas aeruginosan	Nil	Nil	Nil
Staphylococcus aureus	Nil	Nil	Nil
Total aerobic count	Nil	Nil	Nil
yeast & mold	Nil	Nil	Nil
Medicated herbal shampoo for colored hair	Tests		
- Appearance - fragrance - texture	- creamy, pink color - odor - smooth		
Wetting time	180		

Surface tension (j\cm)	172
Foam ability	Heavy
PH	5.53
Viscosity(cps)	845
Present of solid contents (%)	21%
Dirt dispersion	Good (light pigment)
Stability (at 45 °C for 14 days)	Stable
Skin irritation	No irritation

P H

The pH of shampoos is found to important for improving and enhancing the qualities of hair, minimizing irritation to the eyes and stabilizing the ecological balance of the scalp. Mild acidity prevents swelling and promotes tightening of the scales, there by inducing shine. Ph measurement 5.53 which is near to the skin thus good result obtained.

This result was in agree with Gouri Kumar Dash, who reported in 2017 same results and justified the effect on shampoo PH was positive.

Dirt Dispersion

Shampoo that cause the yellow pigment to concentrate in the foam is considered poor quality, the dirt should stay in water. Dirt that stays in the foam will be difficult to rinse away.

Results obtained from investing the invented shampoo showed that no dirt stayed at the foam, all dirt were in aqueous part thus very easy to rise away, as shown in Figure

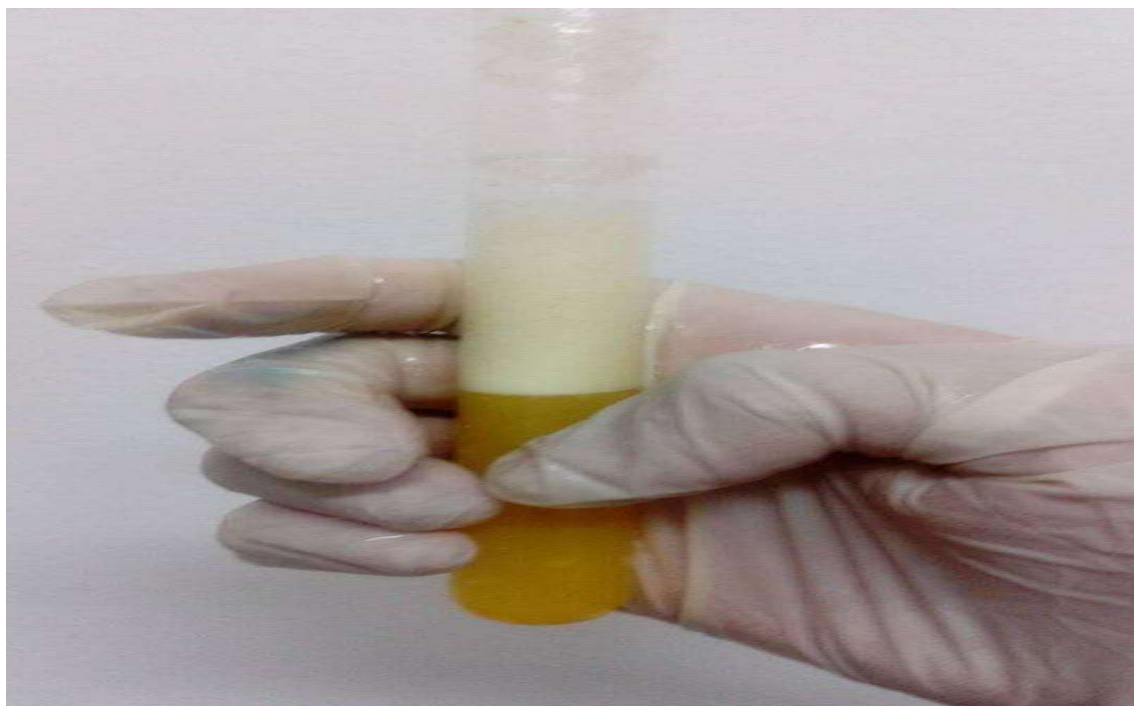


Figure invented shampoo foam showed free of dirt.

Once the foam is holding dirt, dirt will redeposit on the hair. this mean that the dirt will remain no longer in the foam.

This obtained result is in agree with Khaloud Al. Badi.etal, as investigated in 2014.

Solid Contents

If the shampoo has small amount of solidsit can perform better on hair. The result of percent of solids contents is plotted in previous mentioned table. Percentage solid content is 21%. This figure showed a remarkable effect of shampoo at this concentration of total solid. Same finding was reported by Gouri Kumar Dash.etal in 2017 for the effect of total solid on shampoo effect.

Surface Tention

It has been calculated by capillary rise method. Surface tension reduction is one of the mechanisms implicated in detergency. The results are 172 j/cm agree with Khaloud Al Badi.etal. 2014, are shown in Table 4.33

Wetting Time

Wetting time of a substance is a function of its concentration. As time increase the foam stability decrease method is used as it is easy and time saving. results are shown in Figure 4.26 wetting time is 189 s. this result is very close to result of elvive shampoo that is 182 s, thus good results were obtained from invented shampoo in comparison to the band name shampoo.

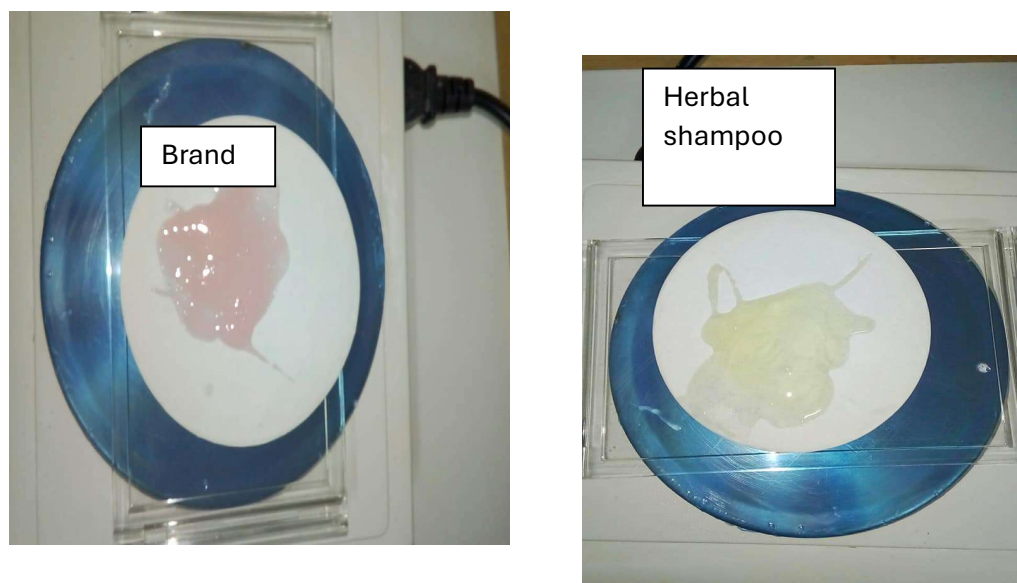
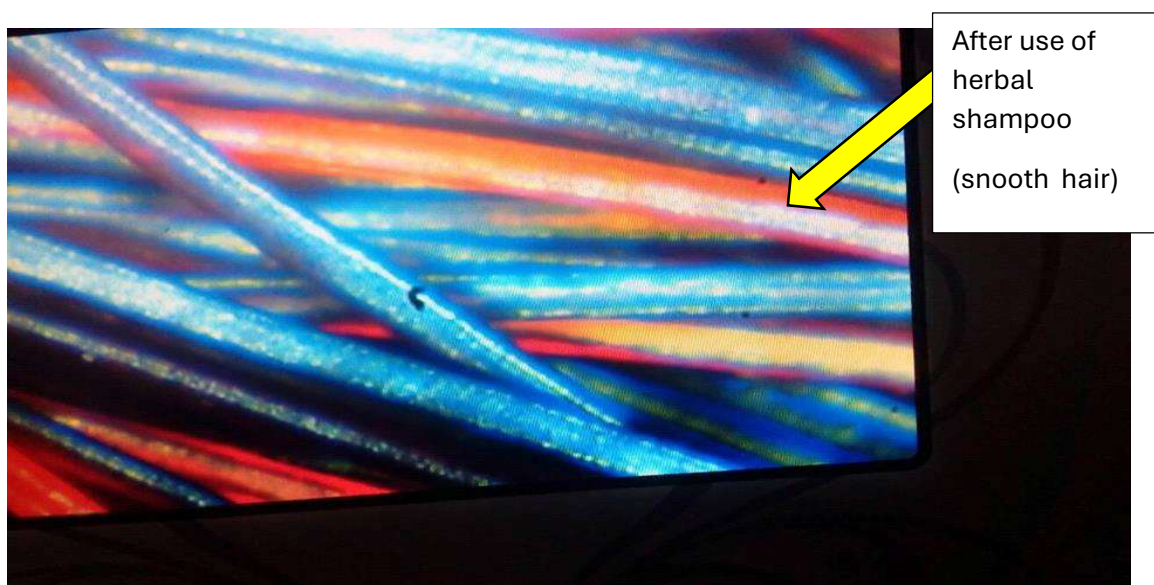
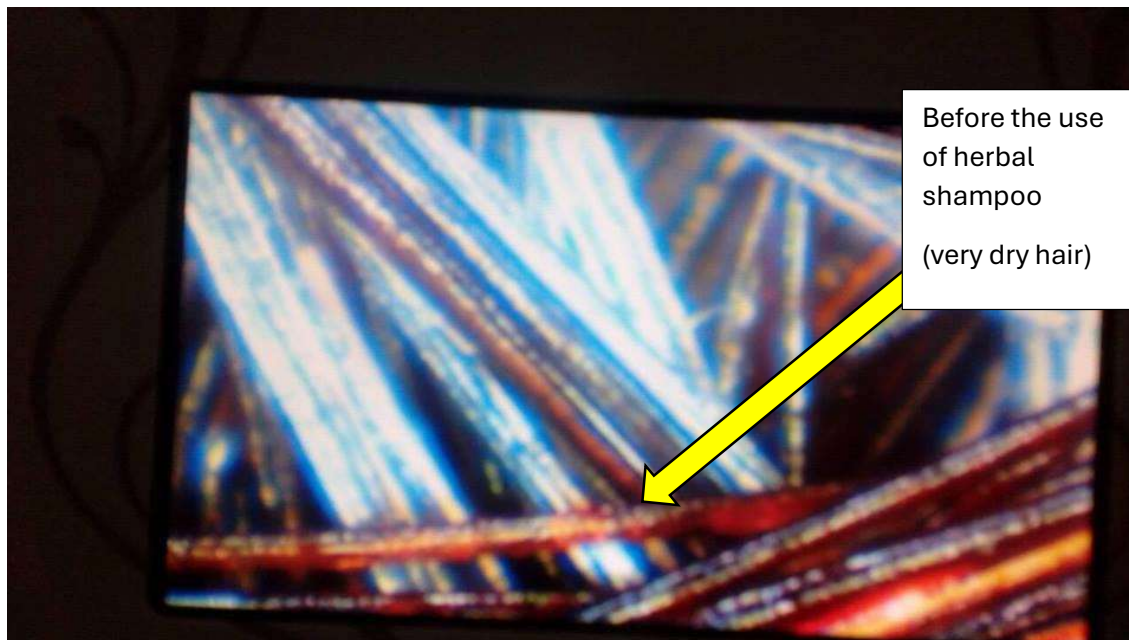


Figure 4.3 the wetting time required for herbal shampoo and band name shampoo.

Foaming Stability

Although foam generation has little to do with the cleansing ability of shampoos, it is of paramount importance to the consumer and is therefore an important criterion in evaluating shampoos.

The foam stability was very much like accepted. This result as shown in Figure 4.27 was agreed with results reported by Gouri Kumar Dash et al. who reported in 2007 when time increase foam stability decrease.



Conclusion

In this study formulated a herbal shampoo containing Palestinian medical herbs and Moroccan plant as argan oil are used as materials. The formulation was also evaluated for the physicochemical properties using recommended procedures. The shampoo revealed ideal characteristics of a shampoo for colored hair. The shampoo was devoid of any harmful chemicals and can be used as an alternative to its synthetic counterpart

1. medicated herbal shampoo for colored hair with argan oil improve hair growth, moisturize colored hair, prevent colored hair damage, fix hair dyes for more time
2. Medical herbs used in this study as natural ingredients work as treatment for colored hair
3. Texapon surfactant is safe ingredient in shampoo for colored hair
4. Dextrins, starch, salt are natural thickeners for formulating natural shampoo for colored hair
5. roselle, henna ex, olive, green tea extracts are good medical herbs used in formulation medicated herbal shampoo for protecting colored hair .

Recommendation:

1. Medical herbal shampoo for colored hair should be used instead of commercial shampoo, because it contains medical herbs, commercial shampoo contains many chemicals.
2. Medical herbal shampoo for colored hair is new product in Palestine that can provide national economics.
3. Medical herbal shampoo is new Palestinian research in the world that we must proud of it around the world.
4. Palestine and morroco have natural medical herbs should be used in correct way

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