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Formulation, Evaluation And Development Of Cymbopogon Citratus And Cinnamomum Camphora

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ABSTRACT:
Shower gel is a liquid cleanser you use to clean your body. Its texture is much thicker and firmer than body wash, and it has different effects on your skin, too. And because of its texture, it can feel slick against your skin. But if your skin is naturally dry, it can be too harsh. But shower gel is great for cleaning oily skin and even body acne because of its drying effects. Its ingredients can be a lot harsher, too. And it's not heavy on fragrance either.Unlike body wash, shower gel's main goal is to get you clean, not pamper your skin. Soxhletion and vacuum distillation methods are effective and efficient means of extracting Essential oils Containing Shower Gel. Extraction is the most common and most economically technique for extracting Essential oil in modern Herbal industry because of its simplicity.
Keywords: Glycosides, Extrudability, Citral α, Citronellal.

INTRODUCTION:

The shower gel has a lower pH level than soap. Shampoos are based on complex systems of surfactants having the function to cleanse the hair. Because of their everyday use it is not surprising that the shampoo market comprises approx. 12% of the total personal-care industry. Body wash, often referred to as shower gel too, plays a significant role in our daily hygiene routine, as it helps remove dirt, oils, and impurities from the skin while offering an enjoyable bathing experience. The science behind body wash formulation is essential for creating products that effectively cleanse, nourish, and protect the skin without causing irritation or dryness. In this comprehensive guide, we will explore the various ingredients, processes, and considerations involved in formulating body washes that cater to different skin types, preferences, and concerns. These products are complex systems consisting of about 80 wt.% water, 10wt.% surfactants, 5wt.% viscosity modifiers, 2wt.% preservatives, fragrances and colorants and about 3wt.% of performance additives. Few things are more important to customers than using thick (rich) shampoo product correlating this directly with value and concentration. A shampoo is not only expected to be easy to use but to meet also sensory criteria that will appeal to the customer. One main rheological parameter that correlates with the thickness and flow properties of a shampoo is the viscosity. The viscosity affects both the cleansing

efficiency and the user perception of a shampoo product. In addition to that it also influences the foaming properties, production filling, packaging, storage and long-term stability of the product. Viscosity is a quite important parameter! As was mentioned already, customer perception is one of the most important parameters, however who is the customer and what does he expect? The three different customer groups Female, Male and Children (Infants) have different views on the same product class because they usually put different amounts of energy into a shampoo when they i.e. squeeze it out of the bottle or distribute it on themselves. This is due to the fact that the different processes will happen at different stress levels (as the customer groups apply different forces) and thus result in different shear rates. As no customer wants to experience the viscosity the product has at rest (rich and creamy) when they actually use the product, a shampoo has to be a non-Newtonian or better shear thinning fluid. To induce non-Newtonian flow and thus modify the flow behaviour towards the specific customer groups, water-soluble polymers are used as modifiers. This contribution is to show how products for those different customer groups differ rheological and how easy. The product at issue is a shower gel, of different scents (sunny melon and power fruit), put up for retail sale.Shower gel is a daily hygiene product in aqueous form, without soap. It has the same objective as soap: it's used to cleanse the body of all the impurities which build up on your skin. However, don't confuse shower gel with liquid soap, because it doesn't contain saponified oil. Instead, it contains synthetic surfactants derived from either petrol or plants. Shower gels are mostly water with small quantities of active ingredients and additives (humectants, pH adjusters, preservatives, etc…) so are suitable for all skin types. Plus, shower gel is less drying for your skin than traditional soap, thanks to its neutral pH, which is weaker than that of soap. Body wash formulation is a multifaceted process that encompasses principles from chemistry, biology, and physics. The objective is to create a product that effectively cleanses the skin, provides a pleasant sensory experience, and caters to diverse skin types and concerns. Surfactants are the primary cleansing agents in body wash formulations. These substances have both hydrophilic (water-loving) and lipophilic (oil-loving) properties, which allow them to break down dirt, oils, and impurities and rinse them away in water. Some common surfactants found in body washes include sodium lauryl sulfate (SLS), sodium laureth sulfate (SLES), cocamidopropyl betaine, and decyl glucoside. Formulators typically use a mixture of primary and secondary surfactants to achieve optimal foaming, cleansing, and skin compatibility. [1] [Anand, R., Gill et.al 2014]

MATERIALS AND METHODS:

Methods:

Selection of active:

- Citral α, Citral β, Nerol Geraniol, Citronellal, Terpinolene, Geranyl acetate, Myrecene and Terpinol Methylheptenone. Citral is important in flavor formation of the plant. Major constituents such as neointermediol (7.2%), selina-6-en-4-ol (27.8%), α-cadinol (8.2%), methyheptenone (1.2%), eudesma-7(11)-en-4-ol (5.3%), 3, 7-dimethyl-1, 3, 6-octatriene (0.58%), decanal (0.25%) and naphtalene (0.79%).
- 1,8-cineole, eugenol, and myrcene, among. The species contains volatile chemical compounds in all plant parts, and the wood and leaves are steam distilled for the essential oils. Camphor laurel has six different chemical variants called chemotypes, which are camphor, linalool, 1,8-cineole, nerolidol, safrole, and borneol. In China, field workers avoid mixing chemotypes when harvesting by their odour.[2,3,4]

Collection and Authentication:

Oil authentication is a quality assurance process that ensures the correct plant species and plant parts are used as raw materials for herbal medicines. The proper authentication of herbal raw materials is critically important to the safety and efficacy of herbal medicines. Lemongrass and Camphor were purchased from local market and authenticated in botanical department by botanist.**(Kumar Ganesan. et.al 2016)**

Extraction Method:
Vacuum distillation is distillation performed under reduced pressure, which allows the purification of compounds not readily distilled at ambient pressures or simply to save time or energy. This technique separates compounds based on differences in their boiling points. [5,6] This technique is used when the boiling point of the desired compound is difficult to achieve or will cause the compound to decompose. Reduced pressures decrease the boiling point of compounds. The reduction in boiling point can be calculated using a temperature-pressure nomograph using the Clausius–Clapeyron relation. **(Saleem U. et.al 2017)**

Soxhlet Extraction:
Soxhlet extraction is a continuous solid / liquid extraction. A solid which contains the material to be extracted is placed in what is called a thimble. A thimble is made out of a material which will contain the solid but allow liquids to pass through. A lot like filter paper. The thimble containing the material is placed in the Soxhlet extractor. An organic solvent is then heated at reflux. As it boils its vapors rise up and are condensed by a condenser [7, 8]

Selection of base:
The main objective of the present study was to prepare an Anti- Bacterial and Anti- Microbial Shower Gel Formulation incorporated into the gel, hence gel base are used.

Formulation of Anti- Bacterial and Anti- Microbial Shower Gel:

TABLE.1: FORMULATION OF ANTI- BACTERIAL AND ANTI- MICROBIAL SHOWER GEL

Ingredients	Parts Used	Category	Qty%
Fresh Lemongrass 	Leaves	Antimicrobial Antibacterial	5
Camphor 	Leaves	Antimicrobial Antibacterial	5

EDTA	-	Chelating Agent	0.1
Allantoin	-	Moisturizing agent	0.1
Acrylic Polymer	-	Gelling agent	8
Glycerin	-	Humectant	3
Propylene Glycol	-	Humectant	2
TEA	-	Neutralizer	0.3
Coco Glucoside	-	Foaming Agent	10
Decyl Glucoside	-	Foaming Agent	8
CAPB	-	Foaming Booster	5
Phenoxy Ethanol	-	Preservative	0.8
Sodium Cloride	-	Thickening agent	0.8
Citric Acid	-	pH Stabilizer	0.1
Water	-	Solvent	51.8

EXPERIMENTAL WORK:

Extraction of Fresh Lemongrass using Vaccume Distillation: [9, 10, 11]

Vaccume Distillation

Vacuum distillation is distillation performed under reduced pressure, which allows the purification of compounds not readily distilled at ambient pressures or simply to save time or energy. This technique separates compounds based on differences in their boiling points.[12] This technique is used when the boiling point of the desired compound is difficult to achieve or will cause the compound to decompose.Reduced pressures decrease the boiling point of compounds. The reduction in boiling point can be calculated using a temperature-pressure Industrial-scale vacuum distillation has several advantages.[13,14] Close boiling mixtures may require many equilibrium stages to separate the key components. One tool to reduce the number of stages needed is to utilize vacuum distillation.Vacuum distillation c typically used in oil refineries have diameters ranging up to about 14 meters (46 feet), heights ranging up to about 50 meters (164 feet), and feed rates ranging up to about 25,400 cubic meters per day (160,000 barrels per day). **(Neethu Letha, et.al 2016)**

Vacuum distillation can improve a separation by:

Prevention of product degradation or polymer formation because of reduced pressure leading to lower tower bottoms temperatures, Reduction of product degradation or polymer formation because of reduced mean residence time especially in columns using packing rather than trays.Increasing capacity, yield, and purity.Another advantage of vacuum distillation is the reduced capital cost, at the expense of slightly more operating cost.[15]

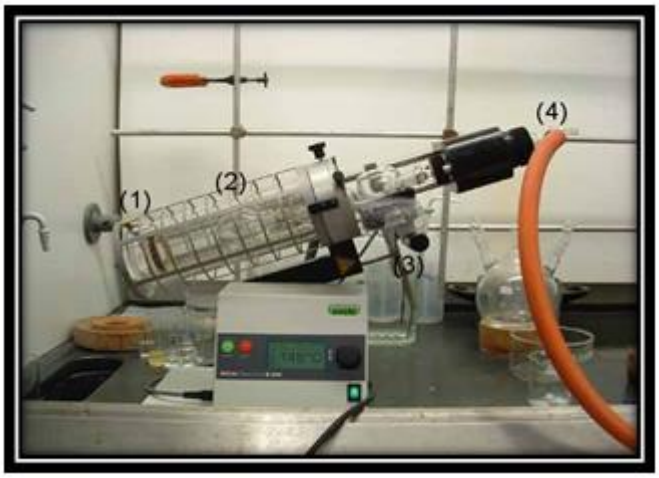


FIG. NO.1 - VACUUM DISTILLATION APPARATUS

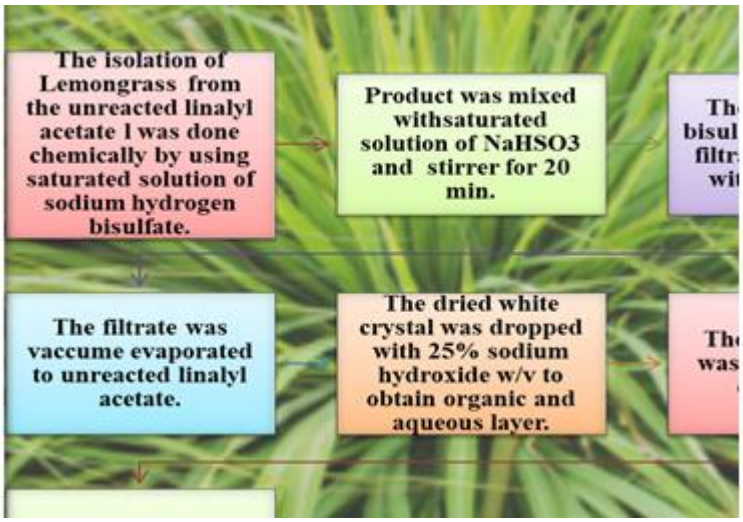


FIG NO.2-EXTRACTION OF FRESH LEMONGRASS OIL BY VACCUME DISTILLATION

Extraction of Camphor oil using Soxhletion Methods:

Soxhlet extraction: [16,17,18]

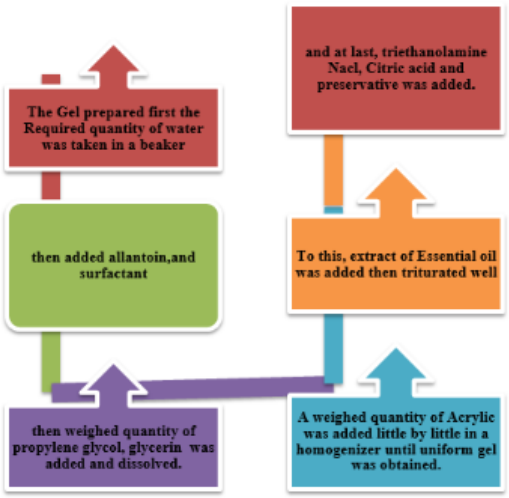
Soxhlet extraction has traditionally been used for a solid sample with limited solubility in a solvent in the presence of insoluble impurities.A porous thimble loaded with a solid sample is placed inside the main chamber of the Soxhlet extractor. By refluxing the solvent through the thimble using a condenser and a siphon side arm, the extraction cycle is typically repeated many times.Soxhlet extraction is a rugged, well-established technique and permits unattended extraction. However, it requires a long extraction time and the consumption of a large amount of solvent. Soxhlet extraction is a very useful tool for preparative purposes in which the analyte is concentrated from the matrix as a whole or separated from particular interfering substances. Sample preparation of environmental samples has been developed for decades using a wide variety of techniques.Solvent extraction of solid samples, which is commonly known as solid–liquid extraction (also referred to as leaching or Lixiviation in a more correct use of the physicochemical terminology), is one of the oldest methods for solid sample pretreatment. **(Monil Yogesh Neena, et.al 2018)**

FIG NO 3- SOXHLET APPRATUS

Procedure

FIG. NO 4- EXTRACTION OF NATURAL OIL BY SOXHLETION

Preparation of Gel base: [19,20]



Preparation of Anti- Bacterial and Anti- Microbial Shower Gel [21,22]

Apparatus and reagents

- Pipette
- Funnel
- 50ml and 120ml beakers
- Distilled water
- Chemicals

Procedure

The Gel prepared first the Required quantity of water was taken in a beaker then allantoin and surfactant was added then weighed quantity of Glycerin, propylene glycol, was added and dissolved. A weighed quantity of acrylic was added little by little in a homogenizer until uniform Gel was obtained. To this, extract of Natural oil was added then triturated well and at last, triethanolamine, preservative, Nacl, citric acid was added. [23]

Evaluation of Anti- Bacterial and Anti- Microbial Shower Gel. [24,25,26]

a. pH- The pH of the Gels was determined using a digital pH meter. The pH value of the Gel was 7.4 which are considered acceptable to avoid the risk of irritation on application to the skin.

b. Spreadability- The spreadability is very much important as it shows the behavior of Gel that comes out from the tube. It is used to identify the extent of spreadability by the Gel on the skin.[24,25] A small quantity of sample was placed on a glass slide and another slide was placed above them; 100 g of weight was placed on the slide. The time taken for the Gel to spread on the slide was noted and measured which was found to be 6.5 cm in 5 min. It was calculated using the following formula.

$S = m \times 1/t$

S=Spreadability
m=Weight placed on the slide
l=Length of the glass
slidet=Time taken in seconds

c. Extrudability- To determine extrudability, a closed collapsible tube containing formulation was pressed firmly at the crimped end. When the cap was removed, formulation extruded until the pressure dissipated. Weight in grams required to extrude a 0.5 cm ribbon of the formulation in 10 s was determined. The average extrusion pressure in g was reported. It was found to be 15.3 g/cm2 [27]

d. Viscosity - The viscosity of the different Gel formulae was determined at 25°C using Brook field viscometer DV2T model. The Gel sample (5 g) was placed in the sample holder of the viscometer and allowed to settle for 5 min, and the viscosity measured a rotating speed of 50 rpm at room temperature (25–27°C). The viscosity was found to be 1050 centipoise

e. Irritability- A Small Amount Of Gel Was Applied Externally On The Skin Surface For A Few Minutes And Checked For Reactions On The Skin. It Was Found To Be Non-Irritant.

F. Washability- A Small Amount Of Gel Was Applied Externally On The Skin Surface, And It Was Washed With Running Water. It Was Found To Be Easily Washable.

EvaluationOf Extract

PreliminaryPhytochemicalScreening:

- **Flavonoids:** To test solution adds few drops of NaoH solution formation of dilute acid indicate

presence offlavonoids.[28]

- **Glycosides:** A small amount of alcoholic extract of samples is dissolved in 1ml water and then aqueous sodiumhydroxideis added.Formulationofyellow colourindicates thepresenceof glycosides.[29]

- **Alkaloids (Mayer's test):**1.36gm of mercuric chloride is dissolved in 60ml and 5gm of potassium iodide isdissolved in 10ml of distilled water respectively. These two solvents are mixed and dilute to 100ml usingdistilled water. To 1ml of acidic aqeous solution of samples few drops of reagent is added. Formation of blue orgreencolour indicates thepresenceofalkaloids.[30,31]

- **Phenols (ferric chloride test):** To 1ml of alcoholic solution of sample. 2ml of distilled water followed by a fewdrops of 10% aqueous free chloride solution is added. Formation of blue or green colour indicates the presenceofphenols.[32]

- **Tannins (lead acetatetest):** In a test tube containing about 5ml of an aqueous extract a few drops of 1%solutionofleadacetatewas added.Formationofa yellow orredprecipitateindicatesthe presenceoftannin.[33]

- **Lipids**

In a test tube5 drops of the sample was taken and a pinch of sodium hydrogen sulphate was added. Pungentodoremantesfromthetubewhichindicatesthatglycerinispresentwhichisproducedbyhydrolysisi nfixedoilwhich shows the presenceof lipids.[34,35]**(K Ruckmani, et.al 2017)**

i) Fourier Transform Infrared spectroscopy (FT- IR):

The FT-IR spectra in no significant difference in polymer (carbopol-940), pure Essential oils containing formulations.

The peaks in range of 3000-3500/cm was due to alkane group (-CH3) and these were sharper in all spectrum except polymer because of the coordination of linkages. Some peaks were appeared in range of 1600 -2395/cm were due to the alkene group(C=C) and this was sharper in polymer spectra as compare to others spectrum. This has been indicating strong bond interaction among alkene group of polymer. Whereas, peaks in range of 1020-1160/cm were due presence of phenyl group. Results of FTIR spectra of Essential oils containing formulations were found to be in good agreement and suggested the stability in Essential oils containing formulations with respect to carbopol-940 and penetration enhancers' Essential oils containing formulations. [36]

ii) Thermal analysis:

The stability of Essential oils containing formulations in Acrylic was investigated by thermal analysis using TGA thermograms. The melting point of drug loaded optimized EG6 Essential oils containing a formulation were revealed by the exothermic single sharp peak at -23ºC. The loading temperature was 30ºC. The result of thermal analysis proved the stability Essential oils containing formulations at molecular level. The TGA curve of optimized Essential oils containing formulations.

iii) In vitro drug release study:

The release of Essential oils containing formulations was analyzed for 24 h and calculated the release amount by using regression equation for calibration curve.

$y = 0.0219 x + 0.1325$ with regression coefficient $R2 = 0.9994$ at pH 7.4.

The results indicated that formulated Essential oils containing formulations the highest drug release (96.69%±0.01). Cumulative % drug release profile of Essential oils Containing formulations at pH

7.4 (n=3±SD) The drug release profile of all Essential oils Containing formulations (EG1, EG2, EG13) at pH7.4 showed abrupt release of Essential oils Containing formulations due to high. [37]

iv) Drug release kinetics:
The mode of drug release of has followed Korsemeyer-peppas model, considered as most suitable model for all formulated Essential oils Containing formulations at 7.4 pH due to the greatest coefficient of determination value (R2) and lowest AIC value among other models as shown in indicating that mode of drug release was not dependent on concentration of drug. The Essential oils Containing formulations has shown Fickian diffusion as n<0.45.

v) RSM Optimization data modeling:
The multiple linear regression analysis was utilized for creating a relationship mathematically and expressed as polynomial equation. The positive value of coefficient depicts synergistically effect while negative value shows antagonistically effect on response. The higher value of coefficient indicates that the factor has the strong impact upon response. The result of Multiple Linear Regression Analysis of response has shown % Co-efficient of variation (17.33%), F-value (3.72), R2 (0.75) and mean ± SD (86.29 ± 14.95). [38]

vi) Effect of enhancers on % drug release at Y (pH 7.4):
Significance probability P value (p>0.05) for response Y depicts that linear participation has produced non-significant effect (p< 0.05) synergistically. On the other hand, the cross product participation also produced non-significant effect (p<0.05) antagonistically while quadratic contribution A^2 produce significant (p>0.05) antagonistic effect while B^2 produce non-significant (p<0.05) effect antagonistically.
The polynomial equation is given here in terms of coded factors as:
Y= 96.75+38.28A +26.35B -20.79AB – 30.68 A2-4.07 B2

vii) Optimization of Essential oils containing formulations:
There was comparatively difference in drug release profile from Essential oils containing formulations through cellophane membrane within 24 h time period. The results deducted from RSM data analysis, contour and 3D surface plots indicating EG6 has the maximum % drug release (96.69%) at pH 7.4 than all other Essential oils containing formulations. It has revealed that Essential oils containing formulations EG6 release through cellophane membrane in lesser time and depicted maximum drug release than all other formulations. Therefore, EG6 Essential oils Containing formulations was optimized and chosen for further investigation ex-vivo /in-vivo studies in animal/human models to confirm results.

RESULTS AND DISCUSSION

Evaluation of Extract:

Preliminary Phytochemical Screening:

TABLE NO.2: PRELIMINARY PHYTOCHEMICAL SCREENING

Sr. no.	Alkaloids	Flavonoids	Phenols	glycosides	Tannins	Lipids
1	Essential Oils	+	+	+	+	+

Here, + = Present, - = Absent

Evaluation Parameter of Containing Hair Growth Serum

TABLE NO: 3 EVALUATION PARAMETER OF ANTI- BACTERIAL AND ANTI-MICROBIAL SHOWER GEL

Sr.no	Parameters	Observation
1	**Color**	Colorless
2	**Odor**	Aromatic
3	**Consistency**	Good
4	**pH**	7.4±0.8
5	**Viscosity**	1050±0.2 centipoise
6	**Spreadability**	6.5±0.6 cm
7	**Washability**	Easily washable
10	**Irritability**	Non-irritant
11	**Extrudability**	15.3±1.2 g/cm2

Vaccume Distillation
Result obtained by is shown in Table below

TABLE NO:4 WEIGHT OF OIL WITH RESPECT TO TIME

Weight (g)	**Time (mins)**
0.35	250
0.40	500
0.50	750
0.55	100
0.65	1200

The oil produced byVaccume Distillation Method is 2.45g weight of oil per 100g of dry leaves Fresh Lemongrass thereby producing 2.45% oil yield at 78^0C.

Soxhletion Method
Result obtained by Soxhlet extraction is shown in Table below

TABLE NO: 6 WEIGHT OF OIL WITH RESPECT TO TIME

Weight of oil (g)	**Time (mins)**
0.4	250
0.5	500
0.6	750
0.80	1000
0.90	1200

The amount of pure Essential Camphor oil obtained by extraction method was 3.2g of essential oil per 100g of Camphor sample. This gave 3.02% yield of essential oil. The volume of oil was measured at every 4hr interval to determine the oil yield at varying time. As the time increases the Ethanol solvent reduces thereby leaving the oil in the mixture.

TABLE NO: 5 RESULT OF ESSENTIAL OILS EXTRACTION

Method of extraction	**% yield**
vacuum Distillation	2.45
Soxhletion Method	3.02

Calculation of Percentage Yield of Volatile Oil.

Material Balance for Vacuum Distillation Method

- Weight of Fresh Lemongrass = 100g
- Quantity of hexane used= 600ml, Quantity of Ethanol used= 200ml
- Weight of beaker= 105.26g.
- Weight ethanol and essential oil= 202.55g.
- The weight of oil obtained= 2.45g.
- %yield = ME/MG x 100.
- Where, ME = Mass of essential oil MG = Mass of Fresh Lemongrass leaves sample
- ME = 2.45g MG = 100g.
- By substituting values.
- %yield = 2.45/100 x 100 =3.02%.
- Therefore % yield= 2.45%.

The graph below shows the plot of the weight of essential oil with respect to time for solvent extraction method.

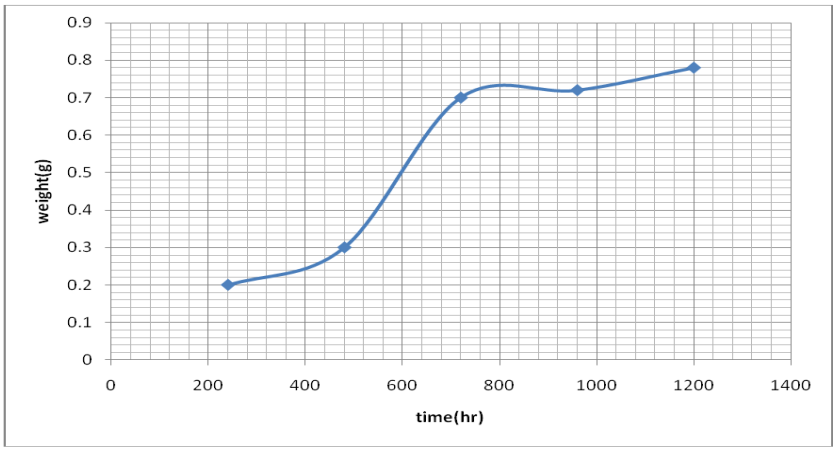


FIG NO: 5 GRAPH BELOW SHOWS THE PLOT OF THE WEIGHT OF ESSENTIAL OIL WITH RESPECT TO TIME FOR VACUUM DISTILLATION METHOD

Material Balance for Soxhletion Method

- Weight of Camphor leaves = 120g
- Quantity of Olive oil used= 600ml, Quantity of Ethanol used= 140ml
- Weight of beaker= 97.86g
- Weight ethanol and essential oil= 100.86g
- The total weight= 3.02g
- %yield = ME/Mg x 100
- Where
- ME = Mass of essential oil, MG = Mass of Camphor leaves Sample
- ME = 3.02g
- MC = 120g
- By substituting values
- %yield = 3.02/120 x 100 = 2.51%
- Therefore % yield= 2.51%
- Graph of the weight (g) of essential oil to the time (mins) for extraction method.

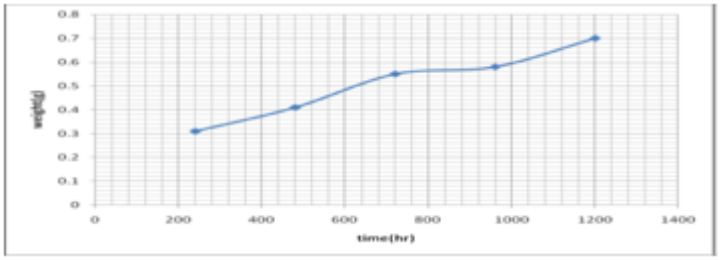


FIG NO 6 GRAPH OF THE WEIGHT (G) OF ESSENTIAL OIL TO THE TIME (MINS) FOR SOXHLETION METHOD

i) Fourier Transform Infrared spectroscopy (FT- IR):

The FT-IR spectra in no significant difference in polymer (carbopol-940), pure Essential oils formulations.

The peaks in range of 3000-3500/cm was due to alkane group (-CH3) and these were sharper in all spectrum except polymer because of the coordination of linkages. Some peaks were appeared in range of 1600 -2395/cm were due to the alkene group(C=C) and this was sharper in polymer spectra as compare to others spectrum. This has been indicating strong bond interaction among alkene group of polymer. Whereas, peaks in range of 1020-1160/cm were due presence of phenyl group. Results of FTIR spectra of Serum were found to be in good agreement and suggested the stability in Essential oils Containing with respect to carbopol-940 and penetration enhancers Essential oils.

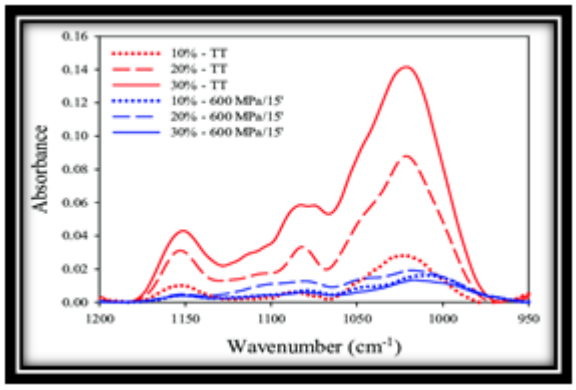


FIG. NO 7 FOURIER TRANSFORM INFRARED SPECTROSCOPY (FT- IR)

ii) Thermal analysis:

The stability of Essential oils Containing Formulation in Acrylic was investigated by thermal analysis using TGA thermograms. The melting point of drug loaded optimized EG6 Essential oils Containing Formulation was revealed by the exothermic single sharp peak at -23ºC. The loading temperature was 30ºC. The result of thermal analysis proved the stability Essential. oils Containing Formulation at molecular level. The TGA curve of optimized Essential oils Containing Formulation.

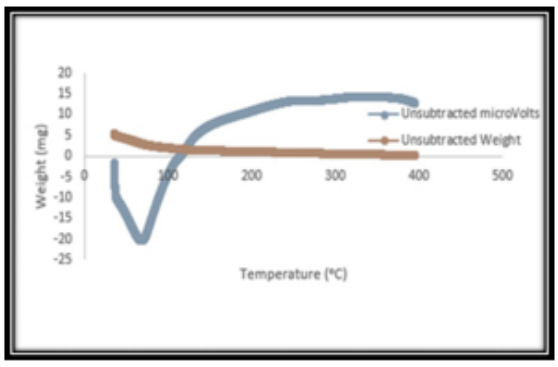


FIG. NO 8 THERMAL ANALYSIS

iii) In vitro drug release study:
The release of Essential oils Containing Formulation was analyzed for 24 h and calculated the release amount by using regression equation for calibration curve.
y = 0.0219 x + 0.1325 with regression coefficient R2 = 0.9994 at pH 6.8.
The results indicated that formulated Essential oils Containing Formulation the highest drug release (96.69%±0.01). Cumulative % drug release profile of Essential oils at pH 7.4 (n=3±SD) The drug release profile of Essential oils (EG1, EG2, EG13) at pH7.4 showed abrupt release of Essential oils due to high.

Trial#	**CodedFactorlevels**
	X_1 (Extract)
EG1	0
EG2	2
EG3	1
EG4	1

TABLE NO: 6 IN VITRO DRUG RELEASE STUDY

Codelevel	-2	-1	0	1
X_1 (Oil Extract) (gm)	0.5	0.75	1.25	1.8

CONCLUSION: The current work was done to prepare Anti- Bacterial and Anti- Microbial Shower Gel using an appropriate base to form a Shower Gel. The prepared Shower Gel was evaluated using various parameters and was found to be satisfied with the application on the skin to make it healthy and glowing without any side effects. Since Lemongrass and Camphor is Essential Anti- Bacterial and Anti- Microbial agents, they are incorporated into the formulation which increases the efficiency of the product.
Shown strong Anti- Bacterial and Anti- Microbial activity and provide smooth Beautifying attractive appearance to skin with lustrous and cleansing effect. Moreover, the stability study has shown no significant effect on the viscosity, homogeneity and pH of all formulations. In summary, formulation has fulfilled the cosmoceutical requirements and considered safe for skin use..

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CONFLICTS OF INTEREST: Authors have no conflicts of interest to declare.

REFERENCES:
1. Anand, R., Gill, K. D., and Mahdi, A. A. (2014). Therapeutics of Alzheimer's disease: past, present and future. Neuropharmacology 76, 27–50. doi: 10.1016/j.neuropharm.2013.07.004
2. Ayaz, M., Junaid, M., Ahmed, J., Ullah, F., Sadiq, A., Ahmad, S., et al. (2014). Phenolic contents, antioxidant and anticholinesterase potentials of crude extract, subsequent fractions and crude saponins from Polygonum hydropiper L. BMC Complement. Altern. Med. 14:145. doi: 10.1186/1472-6882-14-145
3. Navin Kumar Sharma, Prabha Manju M., Babu K., Sreenivasa Prabhu DK., Jayashree M., Jayanthi Swaminathan, Hilda Solomon. 2013. Evaluation of Antimicrobial, Safety and Lavender". Online Etymology Dictionary.

4. Bendahmane, Mohammed; Dubois, Annick; Raymond, Olivier; Bris, Manuel Le (2013). "Genetics and genomics of flower initiation and development in roses". Journal of Experimental Botany. 64 (4): 847–857. doi:10.1093/jxb/ers387. PMC 3594942. PMID 23364936.
5. "Rosa chinensis China Rose PFAF Plant Database". Pfaf.org. Retrieved 13 March 2013.
6. ADC Commercialisation bulletin #4: Fresh cut roses" (PDF). FOODNET Uganda 2009. May 14, 2001. Archived from the original (PDF) on 2012-06-30. Retrieved 13 March 2013.
7. Samanth Subramanian (27 April 2012). "Rooh Afza, the syrup that sweetens the subcontinent's summers". The National.
8. Azizi, Z., Ebrahimi, S., Saadatfar, E., Kamalinejad, M., and Majlessi, N. (2012). Cognitive-enhancing activity of thymol and carvacrol in two rat models of dementia. Behav. Pharmacol. 23, 241–249. doi: 10.1097/FBP.0B013E3283534301
9. Kellner, A.; Benner, M.; Walther, H.; Kunzmann, L.; Wissemann, V.; Ritz, C. M. (March 2012). "Leaf Architecture of Extant Species of Rosa L. and the Paleogene Species Rosa lignitum Heer (Rosaceae)". International Journal of Plant Sciences. 173 (3): 239–250. doi:10.1086/663965. ISSN 1058-5893. S2CID 83909271.
10. Selvamohan, T and Sandhya, V. 2012. Studies on bactericidal activity of different soaps against-bacterial strains. J. Microbiol. Biotech. Res. 2(5) : 646-50.
11. Dhanamani M, Lakshmi Devi S, Kannan S. Ethnomedicinal plants for cancer therapy – a review. Hygeia j drugs med, 3, 2011, 1-10.
12. Nayak S. Influence of Ethanol Extract of Vincarosea on Wound Healing in Diabetic Rats. Online Journal of Biological Sciences, 6, 2011, 51-55.
13. Nishteswar.K and Vidyanath R. Sahasrayogam. 2011. Chowkhamba Krishnadas academy, Varanasi, Third edition. Pg No. 124-5.
14. Burlando, Bruno; Verotta, Luisella; Cornara, Laura; Bottini-Massa, Elisa (2010). Herbal Principles in Cosmetics Properties and Mechanisms of Action. Boca Raton, Florida: CRC Press. p. 303. ISBN 978-1-4398-1214-3.
15. Cyrino, Monica S. (2010). Aphrodite. Gods and Heroes of the Ancient World. New York City, New York and London, England: Routledge. pp. 63, 96. ISBN 978-0-415-77523-6.
16. Bagetta, G., Morrone, L. A., Rombolà, L., Amantea, D., Russo, R., Berliocchi, L., et al. (2010). Neuropharmacology of the essential oil of bergamot. Fitoterapia 81, 453–461. doi: 10.1016/j.fitote.2010.01.013.
17. Riaz S, Ahmad A, Hasnain S. Antibacterial activity of soaps against daily encountered bacteria. Afr. J Biotechnol. 2009; 8: 1431-6.
18. National Non-Food Crops Centre. "Lavender" Archived 16 November 2009 at the Wayback Machine. Retrieved on 23 April 2009.
19. Pasta With Shredded Vegetables and Lavender Recipe, New York Times, 27 August 2008
20. Abuhamdah, S., Huang, L., Elliott, M. S., Howes, M. J. R., Ballard, C., Holmes, C., et al. (2008). Pharmacological profile of an essential oil derived from Melissa officinalis with anti-agitation properties: focus on ligand-gated channels. J Pharm. Pharmacol. 60, 377–384. doi: 10.1211/jpp.60.3.0014
21. Geraldo IM, Gilman A, Shintre MS, Modak SM. 2008. Rapid antibacterial activity of 2 novel hand soaps: Evaluation of the risk of development of bacterial resistance to the antibacterial agents. Infect Control Hosp. Epidemiol
22. National Weeds Program, Potential Environmental Weeds in Australia, Candidate Species for Preventative Control (PDF). Queensland Department of Natural Resources. ISBN 0-642-21409-3. Archived from the original (PDF) on 10 October 2007.
23. Clinical and Laboratory Standards Institute. Performance standards for Antimicrobial susceptibility testing: Seventeenth informational supplement. 2007. CLSI document M100-S17 (ISBN 1-56238-625-5) - 940 West Valley Road, Suite 1400, Wayne, Pennsylvania. 19087-1898 USA: Clinical and Laboratory Standards Institute.

24. Asai, M., Iwata, N., Yoshikawa, A., Aizaki, Y., Ishiura, S., Saido, T. C., et al. (2007). Berberine alters the processing of Alzheimer's amyloid precursor protein to decrease Aβ secretion. Biochem. Biophys. Res. Commun. 352, 498–502. doi: 10.1016/j.bbrc.2006.11.043
25. Umezu, Toyoshi; Nagano, Kimiyo; Ito, Hiroyasu; Kosakai, Kiyomi; Sakaniwa, Misao; Morita, Masatoshi (1 December 2006). "Anticonflict effects of lavender oil and identification of its active constituents". Pharmacology Biochemistry and Behavior. 85 (4): 713–721. doi:10.1016/j.pbb.2006.10.026. PMID 17173962. S2CID 21779233.
26. Angioni, A., Barra, A., Coroneo, V., Dessi, S., and Cabras, P. (2006). Chemical composition, seasonal variability, and antifungal activity of Lavandula stoechas L. ssp. stoechas essential oils from stem/leaves and flowers. J. Agric. Food Chem. 54, 4364–4370. doi: 10.1021/jf0603329
27. Stewart, D. (2005). The Chemistry Of Essential Oils Made Simple: God's Love Manifest In Molecules. Care. ISBN 978-0-934426-99-2.
28. Kampf, G., and A. Kramer. 2004. Epidemiologic Back-ground of Hand Hygiene and Evaluation of the Most Im-portant Agents for Scrubs and Rubs . Clinical Microbiology Reviews. 7: 863-93.
29. Nikbakht, Ali (2004). "A study on the relationships between Iranian people and Damask rose (Rosa damascena) and its therapeutic and healing properties". researchgate. The origin of Damask rose is the Middle East and it is the national flower of Iran. Rose oil usage dates back to ancient civilization of Persia. Avicenna, the 10th century Persian physician, distilled its petals for medical purposes and commercial distillery existed in 1612 in Shiraz, Persia.
30. Riechart RD. 2002. Oilseed medicinals in natural drugs and dieteary supplements-new functional foods. Trends Food Sci. Technol. 13 : 353-60.
31. A Brief History of Thyme and other Herbs by Miranda Seymour, 2002, p.96
32. M. G. Kains (1912). American Agriculturist (ed.). Culinary Herbs: Their Cultivation Harvesting Curing and Uses (English). Orange Judd Company.
33. Cooking with Lavender – Purple Haze Lavender (Sequim, WA)". Purple Haze Lavender.
34. The origin of most of these quotes comes from Dr. William Thomas Fernie, in his book "Herbal Simples" (Bristol Pub., second edition, 1897), page 298:
35. Medicinal Plants, Publication and Information Directorate, New Delhi, p 67, 99,108.
36. Nandkarni KM. Indian Materia Medica, Vol. I, PopularPrakashan, Bombay, pp. 535-53
37. Chakroborty DP. Chemical examination of Feroniaele phantom Corr. J Sci. Industr. Res, 18 B, 1959, 90-91
38. Nanasombat S, Khanha K, Phan-im J, Jitaied J, Wannasomboon S, Patradisakorn S, WongsilA.Antimicrobial and antioxidant activities of the local fruit extracts: application of a selected fruit extract, Phyllanthus emblicalinn. as a natural preservative in raw ground pork during refrigerated storage. The Online J Sci-Tech,
39. Csurches, S.; Edwards, R. (January 1998).
40. Stickler , D.J. , and B. Thomas .1976 .Sensitivity of Providence to Antiseptics and Disinfectants . Journal of Clinical Pathology. 29 : 815-23
41. Friedman, M., and Wolf R. 1996. Clini Dermatol. 14 (1) : 7-13.
42. Williams D.F. and Schmitt W.H. 1996. Chemistry and technology of the Cosmetics and Toiletries Industry. Second edition by Blackie Academic and Professional. Pg No. 300
43. Grieve, M. (1971). A Modern Herbal. Vol. II. New York: Dover Publications, Inc. ISBN 0-486-22799-5.