MODIFICATION OF KUSUM OIL, ISOLATION OF KEY FATTY ACIDS AND PREPARATION OF COSMETICS

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Abstract - *With the increasing modernization, people are becoming more health conscious. This has led to the increasing importance of Cosmetology in today's world. However, the normal cosmetic products are prepared using mineral oils having petroleum origin, which is non-biodegradable and contributes to toxic organics to the environment. The purpose of this research is to produce a range of cosmetic products using Kusum Oil, which is renewable and eco-friendly raw material. Various cosmetics products such as moisturizing lotions, shaving creams and hair conditioners can be prepared using Kusum oil. It has emerged as a very effective ingredient in the preparation of the various cosmetic products. The various physicochemical analyses was carried out with the prepared formulations which gave excellent results. The details regarding the same are available in the further contents of this paper.*

***Key Words*: Non-traditional Oils, Kusum Oil, Eco-friendly, Cosmetic Products**

1. INTRODUCTION

Out of 250000 trees known species only 4500 species, are being examined for oil all over the world. India possesses about 100 non-edible oil bearing seeds. Many of these species are not cultivated, but they grow in the wild. Out of 100 species, only 10 species have attracted the attention of technologists for commercial use, some of which are Mahua, Sal, Neem, Karanja, Jatropha and, Kusum.

Table -1: Estimated total potential of minor oil seeds of tree origin

Sr. No	Variety of Minor Oil Seeds	Seed Potential (in tonnes)	Oil Yield (in %)	Oil Potential (in tonnes)	Nature of Oil
01.	Sal	5,54,000	12.3	6,88,000	Hard
02.	Mahua	4,90,000	35	1,71,000	Hard
03.	Neem	4,18,000	20	83,600	Semi-hard
04.	Kusum	90,000	33	30,000	Semi-hard

Table - 2: Total Utilization of Minor Oil Seeds

Sr. No	Variety of Minor Oil Seeds	Seeds (in tonnes)	Oil (in tonnes)
01.	Sal	2,00,000	20,000
02.	Mahua	71,426	25,000
03.	Neem	25,000	3,125
04.	Kusum	9,900	8,000

Kusum is a dry forest tree which serves as a host for lac insects. Its oil content ranges from 50-62%. Oil is extracted by pressing the seeds in an expeller, which can yield 36% of the oil. This oil is yellowish white to yellowish brown in colour. It is a semi-solid fat having a faint odour of bitter almond. It is composed of 37% glycerol esters. Since it has 91% of fatty acids, it can be used for the preparation of soft soaps which produce more lather. It can be used for the treatment of itches, aches and skin diseases. It also serves as illuminant, lubricant and hair oil. It has a cleansing effect on the scalp. It has the ability to improve the Spreadability as well as the shelf life of the final products.

Table – 3: Physico-chemical Characteristics of Kusum Oil

Characteristics	Values
Specific Gravity (32°C)	0.9099
Refractive Index (40°C)	1.46107
Acid Value	31.3
Saponification Value	234.3
Iodine Value	60.2
Unsaponifiables (%)	2.1
Acetyl Value	4.0
Hehner Value	88.7

Table - 4: Fatty acid composition of Kusum Oil

Fatty Acid	% Composition
Oleic Acid	43
Arachidic Acid	21
Eicosenoic Acid	15
Palmitic Acid	8
Linoleic Acid	4.5
Stearic Acid	1-2
Behenic Acid	1-2
Erucic Acid	1-2

The literature studies reveal that since the 18th century a lot of work has been done in the field of cosmetics. During the very first attempts, natural oils such as almond oil were blended with waxes to yield skin care products. Later, utilization of mineral oil for the preparation of cosmetic products had become the trend. But now technologists are again trying to switch towards the natural raw materials.
With the same objective, this paper highlights the usage of Kusum Oil as a basic raw material for cosmetic preparations. Different formulations were prepared and were tested for their pH value, moisture content, percent solids, surface tension, and viscosity.

2. EXPERIMENTAL PROCEDURE

As a part of this study, cosmetic products such as - moisturizing lotion, shaving cream and hair conditioner were formulated using conventional ingredients and non-traditional Kusum Oil.

2.1 Moisturising lotion

Initially, the specified amount of Stearic acid, Kusum oil, and Rice Bran wax were melted together in a glass beaker. This mixture was then neutralized using TEA. The accurate amount of GMS and soft jelly were weighed, melted and mixed with the neutralized mass to form the oil phase. These contents were heated to about 70°C.
Further, in a separate beaker, all the water phase ingredients were mixed together and heated to 70°C. Now, the oil phase was slowly added into the water phase with continuous agitation. After the complete addition, the mixture was cooled to about 50°C. Other additives such as preservatives and perfumes were added to this to yield the final product.

Table – 5: Composition of Moisturising Cream

Chemicals	Composition
Oil Phase :-	(in g)
Stearic Acid	4
Glycerol Monostearate`	2
Kusum Oil	2
Soft Jelly	1
Rice Bran Wax	3
Water Phase:-	
TEA	4
Glycerol	3
Isopropanol	1
Tween 20	2
Distilled Water	27
Preservative	0.15%
Perfume	0.30%

2.2 Shaving Cream

Initially, specified amount of Stearic acid an Blend oil (a blend of Kusum oil and coconut oil) were melted together in a glass beaker and a mere quantity of GMS was added to the same. In a separate beaker distilled water, glycerol, Borax, 80% KOH solution were mixed together and heated to form a homogenous mixture. Further, the water phase was slowly mixed to the oil phase, which was assisted with vigorous agitation and continuous heating. During this time of mixing the two phases, SLS was crushed into the fine powder form and added to the reaction mass. After the complete addition, the product was cooled to yield shaving cream.

Table – 6: Composition of Shaving Cream

Chemicals	Composition (in g)
Stearic acid	10
Blend Oil	5
GMS	1.5
KOH solution (80%)	5
Glycerol	5
Borax	1
SLS	2
Distilled Water	45

2.3 Hair Conditioner

The oil phase was prepared in a glass beaker by taking an appropriate amount of Kusum oil, bee's wax, soft jelly and GMS and melting them together at to form a homogenous phase.
In a separate beaker, water was heated to about 65 °C and specified quantity of borax and tween 20 were added to it. This was then slowly added into the oil phase with continuous mixing and heating. The product was cooled down to 40°C and the additives were then added to the same.

Table – 7: Composition of Hair Conditioner

Chemicals	Composition
Oil Phase :-	(in g)
Soft Jelly	25%
Kusum Oil	2
Bee's wax	12
Glycerol Monostearate	6
Water Phase :-	
Tween 20	6
Borax	1
Distilled Water	35
Preservative	0.15%
Perfume	0.30%

3. Characterization

1. Moisture content – Water in cosmetic formulations helps to keep the skin smooth and soft, as well as radiant and healthy by retaining moisture in the outermost skin layer. Water is a major ingredient in moisturizer because it helps in mixing the ingredients and retains its homogeneity.
2. Gritty Matter – This test is done to check the presence of solid particles in the prepared formulations.
3. pH – It is the measure of acidity or alkalinity of a product. The pH range of human skin is about 5-6. The pH of the skin products must be near this range so that they are readily accepted by the skin.

4. Consistency – Cosmetic preparations are defined by their viscosity or thickness. Formulating such preparations, therefore, largely depends upon the required end-product consistency, influencing the choice of material to use. One desirable factor (viscosity) in product development is having a product that easily squeezes out of a tube and breaks off cleanly after application.
5. Surface Tension – Different formulations are defined by their viscosity or thickness. The lower the viscosity, the lower will be the surface tension and the more will be its Spreadability.
6. Absorption Rate – When the foam is being sprayed on a piece of filter paper, the time required by the moisture to reach the bottom of the filter paper gives the absorption rate.
7. Foam Content – It is the height of the column of foam that is generated after spraying it in a foam cylinder and shaking it upside down for 40 times.

4. Results and Discussions –

4.1 Results of Moisturising lotion

Tests	Prepared Sample	Std. Reference
• MIV (%)	34.43	26.97
• Gritty Matter (%)	65.57	73.03
• Ph	5.79	5.45
• Consistency	Good	Excellent
• Surface Tension(dyne/cm)	14.13	13.69

4.2 Results of Shaving Cream

Tests	Prepared Sample	Std. Reference
• Absorption Rate (s)	31	20
• pH	6.25	5.8
• Surface Tension(dyne/cm)	13.67	12.84
• Foam content	900ml	1000ml

4.3 Results of Hair Conditioner

Tests	Prepared Sample	Std. Reference
• Viscosity	1.96	3
• pH	1.78	2
• Spreadability	1	1
• Moisture	4.67	5

The aim of the work was successfully achieved. All the prepared samples were consistent and homogenous, off-white in colour and had a pleasant fragrance. The quality analysis reveals that their properties were close to that of a commercial product. When applied on the skin, the moisturising lotion had an emollient effect without much oiliness. pH which is one of the most important property for any skin care product was successfully improved and brought to the permissible limits. The product had good flow and was easily spreadable on the skin, without much drag.
Similarly talking about shaving cream, the pH the sample slightly acidic which is favourable for our skin. The next important factor when it comes to shaving cream is foam. Foam plays a vital role in wetting the beard and smooth flow of razor over the skin. Absorption Rate is also a deciding factor for shaving cream. It is very important that the shaving cream is quickly absorbed by the skin.
Similarly the hair conditioner was the thick opaque liquid. The pH of the sample is acidic. This sample develops a little lather when worked into wet hair and contribute to the conditioning effect, reducing the friction between hair strands.

5. CONCLUSIONS

The significance of these findings, together with the numerous reports on the bio-activity indicate that Kusum Oil is indeed a very promising active component for new functional eco-friendly cosmetic products. It has a proven immediate moisturization and skin barrier enhancing the effect, making it an ideal emollient for a variety of applications within advanced skin care. The soft consistency, combined with a high melting point, offers the formulator many ways to optimize both skin feel and high temperature stability without compromising long shelf life and attractive appearance. Also it doesn't cause any harm to the environment during disposing.
The good stability and the inherently good formulating properties associated with Kusum Oil, in general, open up a number of possibilities, extended by the variety of derived products that can be obtained from this well researched raw material.

REFERENCES

[1] "Encyclopedia of Polymer Science and Technology" John Wiley and Sons 1982 (I Edition) vol-9 Page. No. 182-191.

[2] Patil Pankaj, Gogte B.B., "A Novel Chain Stoppered polymer for detergent Composition," Soaps detergents and Toiletries review, PP 21-25, July 2005.

[3] Agrawal R.S., Kakadkar G. , Gogte B.B., "Sorbital Based Polymeric surfactant for Detergent Formulation," Soaps Detergent and Toiletries review PP 19-20-25, 2003

[4] Ansuman M. Bhagwat and Dr. B.B. Gogte, "A Novel Liquid Stain Remover Cum Detergent Based on

RosinatedAlkal Polymer," Soap Detergent and Toiletries review, 20-25, Sept 2004.

[5] J.R. Dontulwar, B.B. Gogte, "Synthesis of Eco-friendly Detergent by using white Dextrin Sorbitol Moleic Anhydride," Asian Journal of chemistry, Vol-16, nos. 3-4 (2004), 1385-1390

[6] S. K. Kharkate, V. Y. Karadbhajne, B.B. Gogte, "Some resin based eco-friendly liquid detergents," Journal of scientific and Industrial Research, Vol. 64, October 2005, PP 752-755.

[7] Dr. B.B. Gogte, "Sorbitol based polymeric surfactant for detergent powder," soaps detergents and Toiletries April 2003, P.G. 25-28.

[8] Goddard ED, JAOCS, 71 (1), 1994, 1-15.

[9] Dr. V Y Karadbhajne, "A Kinetic study on Malenised Castor Oil (Ricinus Communis)" International Research Journal of Management Science & Technology, Vol. 9 Issue 4 [Year 2018] ISSN 2250 – 1959 (0nline) 2348 – 9367.

[10] Annual Book of ASTM Standard American society for testing and material, Vol-6.01d,1639-70. (1981) ASTM standard Method for acid value of organic coating materials.

[11] Payal S. Choudhari, Dr. V.Y. Karadbhajne, "Modification And Utilization Of Rice Bran Fatty Acid In Cosmetics," International Journal of Innovations In Engineering Research and Technology, Volume- 5, Issue- 6, June- 2018

[12] Madhura Bhalerao, Dr. V Y Karadbhajne, "A Kinetic study on Malenised Castor Oil (Ricinus Communis)" International Research Journal of Management Science & Technology, Vol 9 Issue 4 [Year 2018] ISSN 2250 – 1959 (0nline) 2348 – 9367.

[13] Payal S. Choudhari , Dr. V. Y. Karadbhajne, "Synthesis And Modification Of Rice Bran Fatty Acid For Utilization In Cosmetics," International Journal of Innovations In Engineering Research and Technology, Volume- 5, Issue- 7, June- 2018

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