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Formulation and Evaluation of Activated Charcoal Peel Off Mask

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Abstract: *In today's world, where skincare is a growing priority, this project focuses on developing a natural and effective peel-off face mask using activated charcoal and other skin-loving ingredients. The goal is to create a product that not only deeply cleanses the skin but is also easy to use and gentle on all skin types. Activated charcoal is the key ingredient, known for its powerful ability to draw out dirt, oil, and impurities from deep within the pores. Polyvinyl alcohol is used to give the mask its peel-off texture, while glycerin and aloe vera gel help keep the skin moisturized and soothed.to boost the mask's benefits, neem powder has been added for its natural antibacterial and acne-fighting properties, and orange peel powder provides vitamin C and antioxidants that brighten the skin and improve overall texture. A touch of tea tree oil enhances the mask's anti-inflammatory and antimicrobial effects, and a light fragrance gives it a refreshing finish. The mask was tested for PH, viscosity, drying time, ease of application, and user satisfaction. Results showed it to be safe, effective, and user-friendly- offering a budget-friendly, natural solution for deep cleansing and glowing skin. Unlike conventional peel-off masks formulated with synthetic chemicals that may disrupt sebaceous gland function and compromise the skin's natural barrier, the present formulation employs natural, plant-based ingredients to provide effective cleansing while maintaining skin integrity and promoting dermatological health.*

Keywords: Activated charcoal, Peel-off mask, Natural skincare, Polyvinyl alcohol, Aloe vera, Neem, Orange peel, Tea tree oil, Antibacterial, Antioxidant, Anti-inflammatory, Skin cleansing, Herbal formulation, PH

I. INTRODUCTION

In today's cosmetic industry, facial masks play an important role in skin care and beauty enhancement. Among various types, peel-off masks have gained wide popularity due to their simple application, ease of removal, and instant cleansing effects. These masks form a thin film on the skin surface that can be peeled away after drying, helping to remove dirt, dead skin cells, and blackheads from the outermost layer of the skin. [1]

Activated charcoal, also known as activated carbon, is a highly porous form of carbon with excellent adsorption properties. It effectively attracts and binds impurities, oil, and toxins from the skin surface and pores, leaving the skin clean, fresh, and smooth. Because of these properties, it is widely used in cosmetic formulations such as facial masks, cleansers, and scrubs. [2]

The formulation of an activated charcoal peel-off mask involves the use of film-forming agents like polyvinyl alcohol (PVA) or polyvinylpyrrolidone (PVP), which help create a flexible film that can be easily peeled off. Additional ingredients such as humectants (to retain moisture), plasticizers (to improve flexibility), and preservatives (to enhance shelf life) are included to make the formulation safe, stable, and effective. [3]

The preparation of the charcocoal face mask involed the use of natural products such as:

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Sr. No	Materials	Percentage	Quantity (50g)	Purpose
1	Activated Charcoa	20 %	10g	Adsorbsdirt, Toxinsandexec S oil, Primary Cleansingg Agent
2	Aloeveragel	20 %	7.5g	Moisturizesanddsoothesthe Skin, addmoothnesstothe Texture
3	NutmegPowder	5%	2.5g	Provideexfolitionnandalso Has Anti- Inflamatory AntioxidantProperty
4	TurmicPowder	5%	2g	Anti- Inflammatory andBrightneningeffect
5	NeemPowder	10%	2.5g	Antifungal
6	Orange Peel Powder	10%	2.5g	Helpstonetheskinandreduce Oillness
7	PloyvinyIAlcohol	20%	10g	Providestructurethemask
8	Glycerine	10%	5ml	Humectant
9	Distilled Water (q.s)	10%	5ml	Actasa Solvent
10	Lavender Oil	1%	0.5ml	Providefragrance
		100%	50g	

Table No.1 Material Used

Plant Based Materials Used

1) The activated charcoal powder used in the formulation was directly obtained from thelaboratory stock. [5]

Figure no. 1 Charcoal Powder

2) Neem Powder:

Biological name:Azadirachta Indica Family: Meliaceae

Neem powder used in the preparation of the charcoal peel-off mask was self- prepared.

Frestcollected, thoroughly washed with distilled water, and left to dry in a shaded area at room days. [6]

Once completely dried, the leaves were finely ground using a clean grinder to obtapowder, which was then stored in an airtight container for further use.

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Figure no. 2 Neem Powder

Turmeric Powder :

Biological Name : Curcuma Longa Family : Zingiberaceae

Raw Turmeric was Obtained and dried thoroughly then grind into fine powder and later addes to charcoal peel off mask [7]

Figure no. 3 Turmeric Powder

Nutmeg Powder :

Biological Name : Myristica Fragrans Family : Myristicaceae

Figure no. 4 Nutmeg Powder

Orange Peel Powder :

Biological name: Citrus Sinesis Family: Rutaceae

Orange peel powder was prepared by manually peeling fresh raw oranges, followed by through washing sundrying the peels for 5-7 days under hygenic conditions and then grinding them inton a fine powder using a mechanical grinder.

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Figure No.3 Orange Peel Powder

Aloevera Pulp: [8]

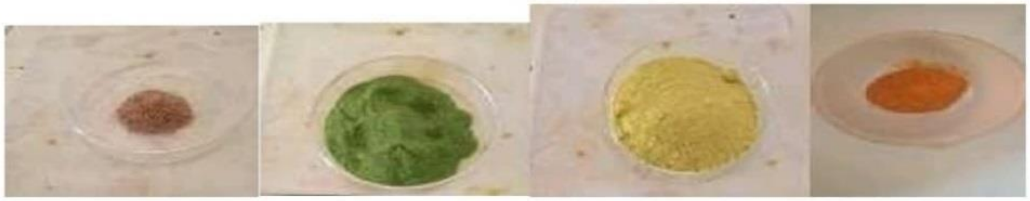
Biological name: Aloe barbadensis miller Family: Asphodelaceae

Aloe Vera was obtained by throughly washing fresh Aloe vera leaves, cutting off the throny edges, peeling away the outer green layer, and scooping out the inner transparent extracted gel Was then filtred to remove any impurities and used in the preparation of the [9]

Figure No.4 Nutmeg Powder

Method Of Preparation :

All Ingredients were accurately weighted using an analytical balance to ensure precision in the formulation. Turmeric Powder and nutmeg powder were initialy triturated using a clean mortar addes sequentially, with continuous trituration after each addition to ensure a homogenous mixture. [10-11]



(A) (B) (C) (D)

Nutmeg Powder, Neem Powder Orange Peel Powder Turmeric Powder

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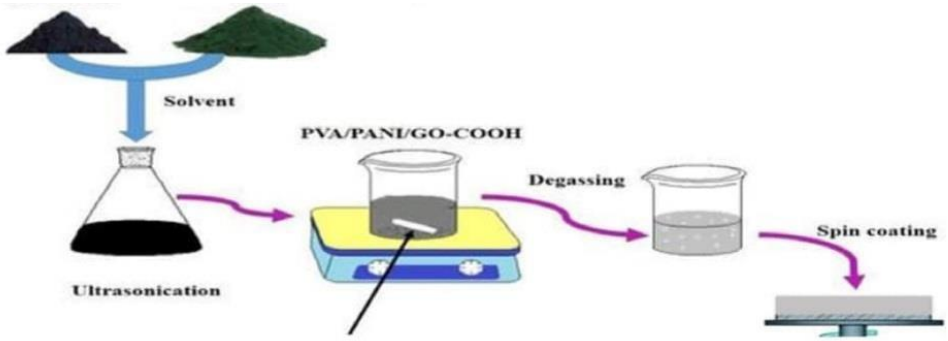

Figure no:8 Preparation of PVA Base Gel

polyvinyl alcohol (PVA) gel base was prepared by dissolving PVA in distilled water at a concentration of 10-15 % The mixture was heated to a temperature range of 79-90 C with continuous stirring until a clear and viscous solution was obtained

Evaluation Tests Of Peel Off Mask :

1) Organoleptic Test

Table no. 2 Organoleptic Test

Parameters	observation
Appearance	Smooth, Thick gel like paste
Colour	Uniformly Black
Texture	Smooth and even, non- gritty
Consistency	Homogenous, easy to spraed
Drying Behaviour	Dries Within 15-25 min. Forms a flexible Form
Peel-Off Qualitiy	Peels Off Easily

2) PH Test :- The pH of the charcoal peel-off mask was measured to evaluate its compatibility with human skil, as an ideal topical formulation should maintain a pH close of the skin (typically 4.5 6-5) to avoid irritation [12]
And maintain skin barrier function.20

Procedure:-

. A Small Quantity (Approximately 1 g) of the charcoal mask formulation was transferred inti a clean beaker

. The Sample was Diluted with 10 mL of Distilled Water to facilitate uniform dispersion and improve the accurancy of the pH reading. [13]

The Mixture Was Stirred thoroughly using a clean glass rod until a homogeneous suspension was obtained [14]

A Universal pH indicator strip was immersed into the prepared solution for a few second, then removed

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After allowing the strip to develop color for 15-30 seconds, the resulting color was compared against the standard color chart provided with the pH strips. [15]

Result: This pH falls within the optimal range of 5.6 which is considered safe for topical application and compatible with the natural pH of human facial skin. The mildly acidic nature of the formulation suggests minimal risk of skin irritation and supports its suitability for cosmetic [16]

3) Irritancy Test: To evaluate the skin compatibility of the formulated charcoal peel-off face mask, an irritancy test was performed on a small group of human volunteers (n = 10) following ethical approval and informed consent. A patch test method was employed wherein a small quantity of the formulation was applied to the inner forearm of each subject and left undisturbed for 30 minutes. The area was then observed at intervals of 1 hour, 24 hours, and 48 hours post-application. [17]

The skin was assessed for any signs of erythema (redness), edema (swelling), itching, or rash.

Each reaction was graded using standard visual scoring scale.

Table no.3 Irritancy Test Result.

Score	Reaction
0	No Reaction
1	Slightlya Erythema
2	Moderate Erythema
3	Severe Erythema or Edema

3) Spreadability Test: Spreadability is an important parameter for topical formulations, as it determines how easily the product can be applied to the skin. A good spreadability value ensures uniform application and enhances user experience. [18]

Method: The spreadability of the formulated charcoal peel-off mask was determined using the slip. [19] and drag method. In this method, 1 g of the formulation was placed between two glass slides of standard dimensions (10 cm × 2 cm). A known weight (500 g) was placed on the upper slide for 5 minutes to compress the sample and ensure uniform thickness. The time taken by the upper slide to slip off under the influence of an applied weight (20 g) was recorded in seconds. 5

Spreadability (S) was calculated using the formula: S = (M x L) / T

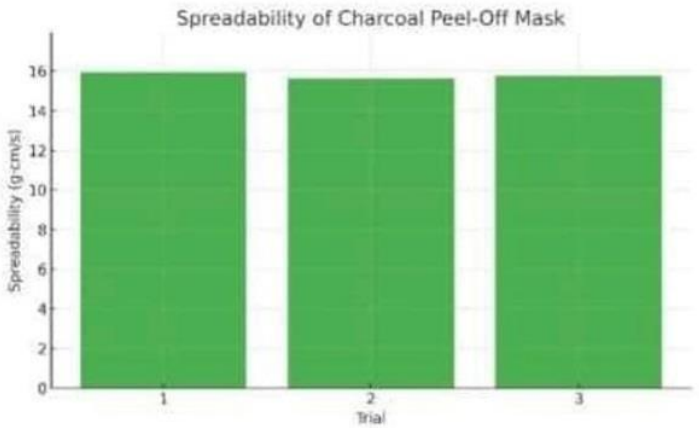

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Table No. 4 : Spreadability Test Results.

Trial	Time (s)	Weight (g)	Length (cm)	Spreadability (g.cm/s)
1	9.4	20	7.5	15.96
2	9.6	20	7.5	16.62
3	9.5	20	7.5	15.79

Average Spreadability = 15.79g*cm/s

Result:

TThe formulated charcoal peel-off mask aimed to provide effective skin cleansing, oil control, and pore purification using activated charcoal as the key functional ingredient and polyvinyl alcohol (PVA) as the film- forming base. The formulation process focused on achieving a homogenous, stable, and skin-friendly product that could be easily applied and removed without causing irritation.

To assess the overall quality and performance of the mask, various tests were carried out including homogeneity, appearance and texture, peel-off ability, drying time, pH, post-application skin feel, and short-term stability. These evaluations help determine the suitability of the formulation for cosmetic use, particularly for individuals with oily or acne-prone skin. [20]

Too

4) Peel-Off Property Test:

The peel-off property of the formulated charcoal face mask was evaluated to determine its ease of removal and film integrity. A thin, even layer was applied to the dorsal hand surface and allowed to dry at room temperature, taking approximately 20-25 minutes. Upon drying, the film was peeled off gently from one edge. The mask removed smoothly in a single sheet without tearing, demonstrating excellent film-forming ability. The film was flexible, strong, and left no residue or irritation on the skin. These observations confirm that the formulation exhibits ideal [21]

Peel Off Characteristics suitabale for cosmetic use, ensuring user comfort :

Fig no .11 (a)

Fig no.11 (b)

Peel Off Property	Forms a Flexible Cohesive Film That Peels of in one Place	Effective Removal Of Impurities Without Skin Irrtation
Drying Time	15-20 minute (Depending on Layer Thickness)	Acceptable for cosmetic skin irritation
Skin Feel After Use	Skin Felt for Smoother Cleanser less Oliy	Cleasing and oil controls without causing dryness or irritation
Stability	No Changes in colour or odor : microbial Growth in Observed	Suggest for short term stability and Shelf life under ambient Condition

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II. CONCLUSION

The aim of formulating Activated Charcoal peel off mask was found to successful with good results. The peel off mask showed a good spreadability. The formulation showed a good peel off property on human skin without causing skin irritation or edema. The study also revealed that the formulation is capable of enlarging the pores and enhancing the cleansing of the skin by removing dead skin on the surface. The skin pores were also observed to be retaining their normal size within an hour of treatment; thus retaining the moisture and nutrients within the skin. The formulation was subjected to stability and thermodynamic stability studies.

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