iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 **Issue:** VI **Month of publication:** June 2024

DOI: https://doi.org/10.22214/ijraset.2024.63435

www.ijraset.com

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue VI June 2024- Available at www.ijraset.com

Formulation and Evalaution of Flaxseeds Hair Gel

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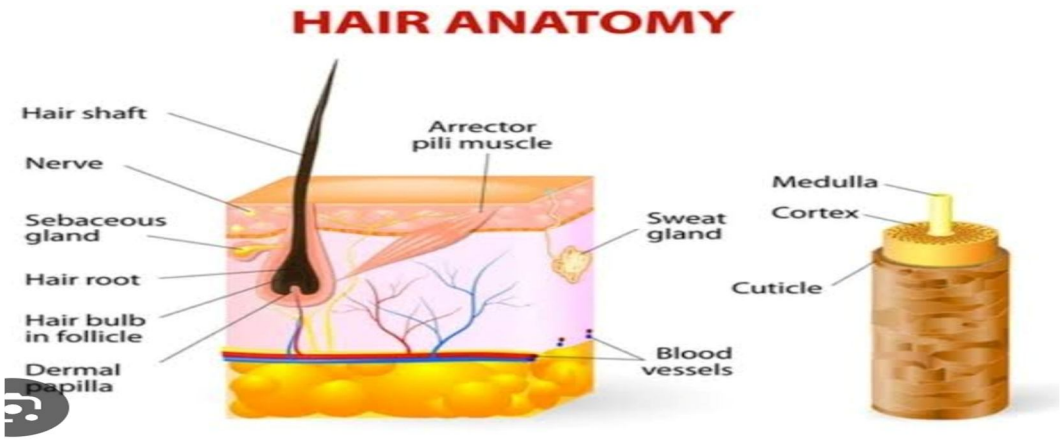
Abstract: ***The remedies used to improve a person's look are called herbal cosmetics. Herbal hair gel eliminates dandruff and helps manage hair loss because it is made with natural components and herbal extracts. The purpose of this study was to create and assess a herbal hair gel using flax seed and aloe vera for its ability to promote hair development and fight dandruff. Vitamin E found in flax seed (Linum usitatissimum) promotes stronger follicles and better hair development. Aqueous extraction was used to create extracts from flax seed and aloe vera. Five distinct gel compositions with varied concentrations of Aloe vera and flax seed extracts were made and assessed. A number of characteristics, including color, scent, gel texture, clarity, pH, viscosity, spreadability, extrudability, and gelstability tests, strength, homogeneity, and in vitro antifungal activity. Out of the five formulations, F4 exhibited long-term stability without sacrificing its antifungal efficacy. Overall, the study's findings confirm that herbal hair gel made with aloe vera and other ingrediente remedies used to improve a person's look are called herbal cosmetics. Herbal hair gel eliminates dandruff and helps manage hair loss because it is made with natural components and herbal extracts. The purpose of this study was to create and assess a herbal hair gel using flax seed and aloe vera for its ability to promote hair development and fight dandruff. Vitamin E found in flax seed (Linum usitatissimum) promotes stronger follicles and better hair development. Aqueous extraction was used to create extracts from flax seed and aloe vera. Five distinct gel compositions with varied concentrations of Aloe vera and flax seed extracts were made and assessed. A number of characteristics, including color, scent, gel texture, clarity, pH, viscosity, spreadability, extrudability, and gelstability tests, strength, homogeneity, and in vitro antifungal activity. Out of the five formulations, F4 exhibited long-term stability without sacrificing its antifungal efficacy. Overall, the study's findings confirm that herbal hair gel made with aloe vera and other ingredientThe remedies used to improve a person's look are called herbal cosmetics. Herbal hair gel eliminates dandruff and helps manage hair loss because it is made with natural components and herbal extracts. The purpose of this study was to create and assess a herbal hair gel using flax seed and aloe vera for its ability to promote hair development and fight dandruff. Vitamin E found in flax seed (Linum usitatissimum) promotes stronger follicles and better hair development. Aqueous extraction was used to create extracts from flax seed and aloe vera. Five distinct gel compositions with varied concentrations of Aloe vera and flax seed extracts were made and assessed. A number of characteristics, including color, scent, gel texture, clarity, pH, viscosity, spreadability, extrudability, and gelstability tests, strength, homogeneity, and in vitro antifungal activity. Out of the five formulations, F4 exhibited long-term stability without sacrificing its antifungal efficacy. Overall, the study's findings confirm that herbal hair gel made with aloe vera and other ingredient.***

I. INTRODUCTION

Flaxseed, also called linseed, is becoming a prominent functional food ingredient due to its abundance of lignans, fiber, and omega-3 fatty acid, α-linolenic acid (ALA).Potential health benefits of flaxseed oil, fibers, and lignans include a lower risk of cancer, diabetes, atherosclerosis, cardiovascular disease, osteoporosis, autoimmune diseases, and neurological problems.2.In addition, flaxseed contains a wealth of fatty acids and antioxidants that aid in clearing the scalp of pollutants and dead cells. Applying flax seed gel to the scalp and hair as a moisturizer can assist to promote growth and strengthen already-existing hair...Topical formulations come in the form of oils, creams, ointments, pastes, and gels; among these, gels are becoming more and more well-liked these days due to their increased stability and ability to offer controlled release in comparison to other semisolid preparations. Gel formulations can offer improved absorption properties, increasing the drug's bioavailability.4. Gels are semisolid systems in which a high degree of physical or chemical cross-linking has been added to a three-dimensional polymeric matrix made of natural or synthetic gums, therefore confining a liquid phase.5.Gels are a relatively recent type of dosage forms made of higher amounts of aqueous hydroalcoholic liquids trapped in a network of colloidal solid particles, which can include organic polymers of natural or synthetic origin, inorganic substances like aluminum salts, or Anatomy of hair.

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The hair root is located in the skin and reaches the skin's deeper layers. The hair follicle, a sheath of skin and connective tissue that encircles it, is joined to a sebaceous gland. The arrector pili, a small muscle that can produce hair, is connected to each hair follicle. The structure of the human hair follicle is fascinating, and there is still much to learn about the composition and development of hair. Three regions make up a hair follicle: the upper segment (infundibulum), the middle segment (isthmus), and the lowest segment (bulb and suprabulb). The erector pili muscle, also referred to as the arrector pili muscle, inserts into the lower section .



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II. HAIR GROWTH CYCLE

Hair development is a continuous cyclic process and all mature follicles go through a growth cycle consisting of growth (anagen), regression (catagen), rest (telogen) and shedding (exogen phases.1.Anagen The secondary epithelial germ in the telogen hair follicle, which is situated between the club hair and dermal papilla, presents the beginning of the anagen phase [5, 16]. The active growth phase known as the anagen is when the hair fibre is formed, the follicle enlarges, and it regains its original shape.

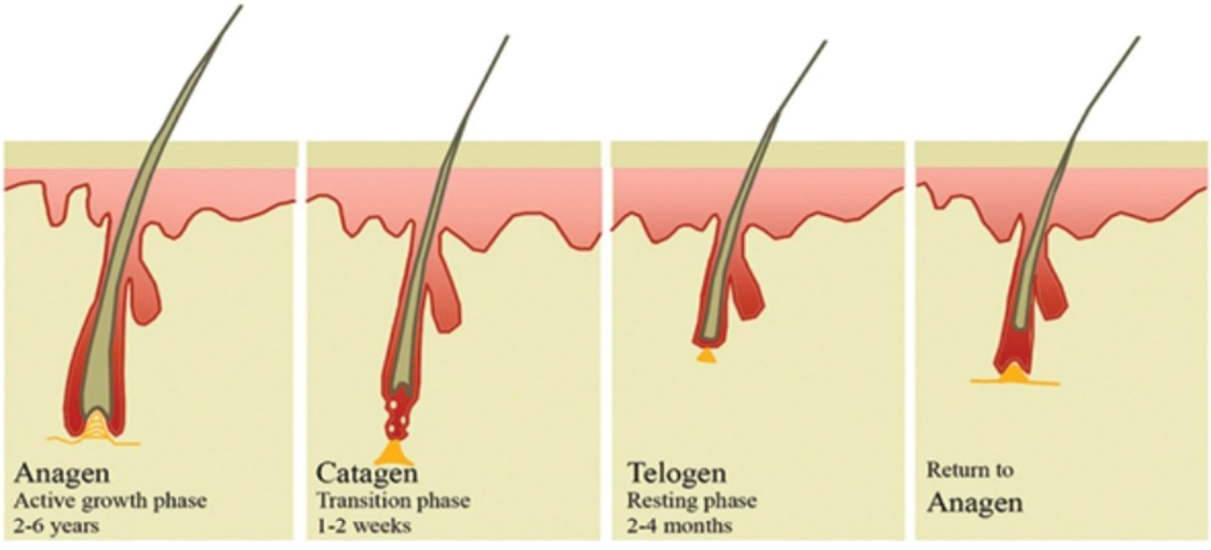


Figure 3.
The hair cycle.

A. Anagen

Anagen is the stage in which 85–90% of scalp hairs are in. An example of the sixth phase of the anagen stage is given. Hair stem cells divide during anagen I–V, enclose the dermal papilla, grow to the skin's surface, and start to multiply hair shaft and IRS, respectively. The shape of the hair shaft then starts to take shape as hair matrix melanocytes start to produce colour; in anagen VI, the hair bulb and surrounding.

B. Catagen

Catagen After anagen, the matrix cells' mitotic activity decreases, and the follicle moves into the tightly regulated involutionary phase known as catagen. In humans, catagen lasts roughly two weeks, depending on the region and kind of follicle [37]. Apoptosis causes the distal portion of the follicle to involute during catagen, whereas the proximal portion of the hair shaft becomes keratinized and produces the club hair [16, 38]. There are eight steps in the catagen phase. The cessation of melanogenesis in the hair bulb is the initial indication of catagen. Cyclical alterations in apoptosis and differentiation are seen in neuroectodermal cell populations, mesenchyme, follicular epithelium, perifollicular vasculature, and neural systems. Nevertheless, any apoptosis that does occur occurs in the dermal papilla because suppressor.

C. Telogen

The time interval between the end of follicular regression and the beginning of the subsequent anagen phase is known as the telogen stage. Two to three months make up the telogen stage. Ten to fifteen percent of the hair is at the telogen stage. The hair shaft changes into club hair at the telogen stage, when it eventually sheds. The follicle stays in this stage until the hair germ, which is sensitive to signals from the dermal papilla that initiate anagen, begins to exhibit increased transcriptional and proliferative activity in late telogen, which causes anagen to begin [2,39]

D. Exogen

Though the patient views it as the most significant aspect of hair development, there is less interest in the mechanism underlying hair shedding. Human telogen hairs are frequently held onto from multiple follicular cycles, which implies that the anagen and exogen stages are separate processes. Exogen refers to this particular shedding phase since it is thought to be an active mechanism that occurs independently of telogen and anagen [16, 33].39].

E. Advantages

They have no unfavourable side effects and don't cause allergic reactions.

1) They blend in effortlessly with skin and hair.
2) Plant extracts have the ability to reduce the bulk properties of cosmetics while also having suitable pharmacological effects.
3) Widely accessible and abundant in both diversity and quantity.
4) Cost-effective and simple to manufacture.

F. Disadvantage

The effects of herbal medications are not as fast as those of allopathic dose forms.

1) Long-term treatment is necessary.
2) Sometimes it's hard to disguise taste and odour.
3) The manufacturing process is intricate and time-consuming.
4) No pharmacopoeia specifies any particular method or components that must be utilised in any

G. Flaxseed Applications

1) Flaxseed for Hair Development Flaxseed gel is great for hair in many ways.
2) Flaxseeds, being an abundant supplier of vitamin E and omega-3 fatty acids, help fortify hair and avert breakage.
3) Flaxseeds can also guarantee hair health by reducing scalp inflammation.

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ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue VI June 2024- Available at www.ijraset.com



III. MATERIAL USED

Preparation

1) Flaxseed
2) Alovera gel
3) VitE capsules
4) Glycerin
5) Triethanolamine
6) Pvp
7) Carbopol
8) Methyl paraben
9) PEG

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- Flowers of flaxseed



- Flaxseed

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A. Alovera

Synonyms :

➢ Indian Aloe, Burn Aloe, True Aloe, and First Aid Plant are synonyms for Alovera. ➢

Biological Source: Dried leaf latex is the biological source of aloe. Other names for it include socotrine aloe, cape aloe, and curacao aloe. It is a member of the
family Liliaceae.

➢ Liliceae family

. Chemical components include: More than 75 distinct substances have been found in aloe vera, including vitamins (A, C, E, and B12), minerals (zinc, copper, selenium, and calcium), enzymes (catalase, amylase, and peroxidase), and sugars (monosaccharides like mannose-6-phosphate and polysaccharides suchglucomannans), anthraquinone.



Figure 2: Aloe vera

B. Glycerin

As a denaturant, fragrance ingredient, hair conditioner, humectant, oral care product, skin protectant, skin conditioning agent, humectant, and viscosity-reducing agent, glycerine serves a variety of purposes. Relevant data pertaining to humans and animals was examined by the Cosmetic Ingredient Review Expert Panel (Panel). Glycerine is safe to use as a cosmetic ingredient when used according to recommended usage and concentration guidelines.



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C. Vitamin E

By feeding your scalp, decreasing hair breakage, and enhancing the suppleness and gloss of your hair, vitamin E also aids in the restoration of damaged hair. Additionally, vitamin E can aid in the neutralisation of free radicals generated by pollutants and UV radiation, shielding your scalp and hair cells from the sun's harmful ray



D. Triethanolamine

Triethanolamine, or TEE, is merely a non-active component that has no effect on the skin. used to stabilise and regulate the pH of formulations. This component enhances the product's texture and its ability to work with skin. Many cosmetic and skin care items, including moisturisers, lotions, mascaras, and eyeliners, contain triethanolamine. The associated TEA-containing substances covered in this safety evaluation are stated to have surfactant and skin- or hair-conditioning properties. The TEA is described as a pH adjuster or surfactant. The exception is TEAsorbate, which is thought to serve as a preservative required for the formation of microgels. For this reason, organic amines such as tri ethanolamine are employed for this reason.
(Mohammad et al.2024)



E. PvP

PVP prevents emulsions from dissolving into their liquid and oil components and aids in the distribution or suspension of an insoluble solid in a liquid. In addition, it keeps the contents of a cake or tablet together. PVP dries and leaves the skin, hair, or nails with a thin layer. PVP prevents hair from absorbing moisture, which helps hair maintain its style when used in hair care products. PVP is a light yellow solid that is also known as povidone or polyvinylpyrrolidone. PVP is utilised in the formulation of many different product kinds in cosmetics and personal care goods, such as mascara, eyeliner, hair conditioners, and hair sprays.



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F. Methyl Paraben

Methyl paraben is a methyl ester of p-hydroxybenzoic acid (CAS No. 99-76-3). For more than 50 years, this stable, nonvolatile substance has been utilised as an antibacterial preservative in medications, food, and cosmetics. Methyl paraben is easily and totally absorbed from the gastrointestinal system and through the skin. It undergoes hydrolysis to yield p-hydroxybenzoic acid, which is then conjugated and quickly eliminated in the urine. No indication of buildup is present. Methyl paraben essentially causes no irritation in people with normal skin.



IV. RESOURCES AND TECHNIQUES

Materials Employed The flaxseeds were obtained from Bengaluru, India's nearby organic farm. The methyl paraben, PEG 200, glycerin, and carbopol 934 were obtained from SD Fine Chemicals in Mumbai, India. The remaining chemicals and reagents utilised were of analytical or laboratory quality.

V. METHODOLOGY

Hair gel base simulation A 250 ml beaker containing 35 ml of water was used to dissolve a weighed quantity of polyethylene glycol and a measured quantity of glycerin and methyl paraben. Next, a mechanical stirrer was used to quickly agitate the liquid. With constant stirring, a suitable amount of PVP and carbopol 934 were gradually added to the beaker containing the liquid mixture above. After that, a slow and constant stirring addition of triethnolamine (a gelling agent) was made until the gel structure was achieved. To maximise the carbopol concentration, five different gels were made (F1 to F5) with different carbopol concentrations of 0.5g, 1g, 1.5g, 2g, and 2.5g, respectively. It was discovered that the gels made with 0.5 and 1 grammes of carbopol 934 were extremely thin and liquid.

Until a thick mucilage was achieved, stir. After that, the mucilage was filtered through an appropriate sieve and kept at room temperature until needed again.8Using a carbopol gel foundation and a straightforward gel manufacturing procedure, five distinct herbal hair gel compositions were created. In a beaker, measured amounts of methyl paraben, glycerin, and polyethylene glycol were dissolved in roughly 35 millilitres of water. After that, a mechanical stirrer was used to agitate the liquid quickly. The beaker containing the liquid above was gradually filled with 2g of optimised carbopol 934 and PVP while being stirred. To create a gel structure, triethanolamine was then gradually added while being stirred constantly. Ultimately, different amounts of flaxseed aqueous extract (5%, 10%, 15%, 20%, and 25%) were added to carbopol gel and agitated for approximately one minute.

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Table 2: Formulation of herbal hair gel

Formulation Code	H1F4	H2F4	H3F4	H4F4	H5F4
Aqueous extract of flaxseed %	5	10	15	20	25
Carbopol 934(g)	2	2	2	2	2
PVP (mg)	5	5	5	5	5
Methyl paraben (mg)	75	75	75	75	75
Glycerine (ml)	3	3	3	3	3
PEG (ml)	6.25	6.25	6.25	6.25	6.25
Triethanolamine(ml)	0.5	0.5	0.5	0.5	0.5
Water (ml)	35	35	35	35	35

VI. EVALUATION OF HERBAL HAIR GEL

A. Formulations Physical Appearance

The physical appearance was visually checked for the appearance, colour and the feel on application of prepared hair gel formulations9. Results are as shown in table 3.

Homogeneity After the gel formulations have been set in the container, all developed gels were tested for homogeneity by visual inspection. They were tested for their appearance and presencelumpsflocculates or aggregates10 pH determination

B. PH

The pH of all hair gel formulations were determined by using the digital pH meter11One gram of gel was dissolved in 100 ml distilled water and stored for two hours. Electrodes were completely dipped into the hair gel formulations and pH was noted. The measurement of pH of each formulation was done in triplicate and average values.

C. Determination of Extrudability

Metal tubes that could collapse were filled with the hair gel mixtures. The material was forced through the tubes, and the formulations' extrudability was verified12. The weight in grammes needed to extrude a 0.5 cm gel ribbon in 10 seconds was used to assess the extrudability of the formulations. Table 3 displays the hair gel compositions' relative 489extrudability. determination of viscosity The viscosity was measured using a Brookfield viscometer. A sufficient amount of gel was added to each wide mouth jar independently. The gel in the jar should be high enough to allow the spindly to be dipped. The spindle was set to run at 2.5 RPM. The formulas' viscosities were noted. The results are as shown in

D. Plan of Work

1) Organoletic Properties

The colour of herbal gel formulation were found to be dark white with translucent appearance which was found to be smooth on application. translucent appearance which was found to be smooth on application.

- Colour:-
- Odour:-
- Appearance:-

2) pH Determination

The pH of the herbal gel formulations ranged between 6.7 hair, indicating the compatibility of the herbal gel formulations with the hair.

3) Homogeneity

The developed gels were tested for homogeneity by visual inspectionfor appearance and presence of any lumps, flocculates or aggregates. The homogeneity was found to be good of herbal gel formulation.

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4) Viscosity Determination

Viscosity is an important parameters for characterizing the gels as it effect the spreadability, extrudability and release of the drug. The viscosity of the formulations were found in the rangeof 1,50,232 to 1,52,876 cps. From the results it is clear that as the concentration of flaxseed extract increased from 5% to 20%theviscosity of the formulations also increased.

5) Spreadability

Spreadability plays an important role in patient compliance and help in uniform application of gel to the hair. A good gel takes less time to spread and will have high spreadability. The spreadability of formulated gel was decreased as the concentration of gelling agent increased.

VII. MATERIALS AND METHODS OF BASE

Materials Used:- Flaxseeds were procured from the local organic farm, Bengaluru, India. Carbopol 934, Methyl paraben and Sodium chloride and Reagents use were og either analytical or laboratory grade

Fig. 2.2 Mechanical Stirrer

The gels formed using 0.5gcarbopol 934 were found to be very thin that liquefied within 4 to 5 hours of preparation. The gel formed using 1g carbopol 934 gel formation was better tosomeextent but the problem of liquefaction after 24 hours was observed. The gel formulation containing 1.5g of carbopol 934 formed uniform and smooth gel that did not liquefy even after 24 hrs. With 2gcarbopol 934 the gel formation was better to some extent but problem was too thick tohandled.Whereas gel containing 2.5g carbopol 934 was too thick to be handled.Among the Five formulations, gel containing 1.5g carbopol 934.



Fig. 2.1 base formulation of hair gel



Fig. 2.2 Mechanical Stirrer

Table1.2 Ingredients And it`s Category

Sr. No.	Ingredients	Category
1.	Flaxseed extract	Anti-Bacterial & Anti-Fungal
2.	Carbopol 934	Gelling agent
3.	Methyl paraben	Preservative
4.	Sodium Chloride	pH adjuster
5.	Neutral blue	Colorant

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VIII. RESULTS AND CONCLUSION

A. Physicalappearance

1) Every herbal gel formulation, including H1F4, H2F4, H3F4, H4F4, and H5F4, was discovered to have a pale hue, a translucent appearance, and a smooth application.

2) Homogeneity: The homogeneity of all the gels that were generated was examined visually to ensure that there were no lumps, flocculates, or aggregates present. For every formulation, the homogeneity was found to be satisfactory.

3) PH determination: All of the herbal gel formulations had a pH between 6.7 and 7.3, which was suitable for the hair and showed that the formulations were compatible with the hair.

4) Determination of extrudability: When extruded from a metallic collapsible tube, every formulation demonstrated good extrudability. H4F4 and H5F4 demonstrated superior extrudability compared to H1F4, H2F4, and H3F4. How to determine viscosity:

IX. CONCLUSIONS

The flaxseed hair gel formulations provide a tremendous result in treatment of the scalp and strengthens the hair thereby inhibiting the hair loss.

Flaxseed hair gel also prevents the hair from dandruff. Flaxseed also acts as an Anti-dandruff agentand involved in to reduce the generation of dandruff flakes. Flaxseed hair gel is prepared by simple boiling procedure, so it is less in cost and easy to handle. In flaxseed hair gel the aloe vera gel is also incorporated so it results in elimination of dandruff from scalp and protective for hair and provides healthy growth.

The evaluation of the formulations was done on various parameters like physical appearance, pH, homogeneity, viscosity, spread ability, extrudability, and stability, In vitro evaluation study. The evaluation results shows that the flaxseed hair gel is compatible for hair and it having less side effects and these parameters show results in standard range. Hence, there is a further opportunity for pharmacological studies in

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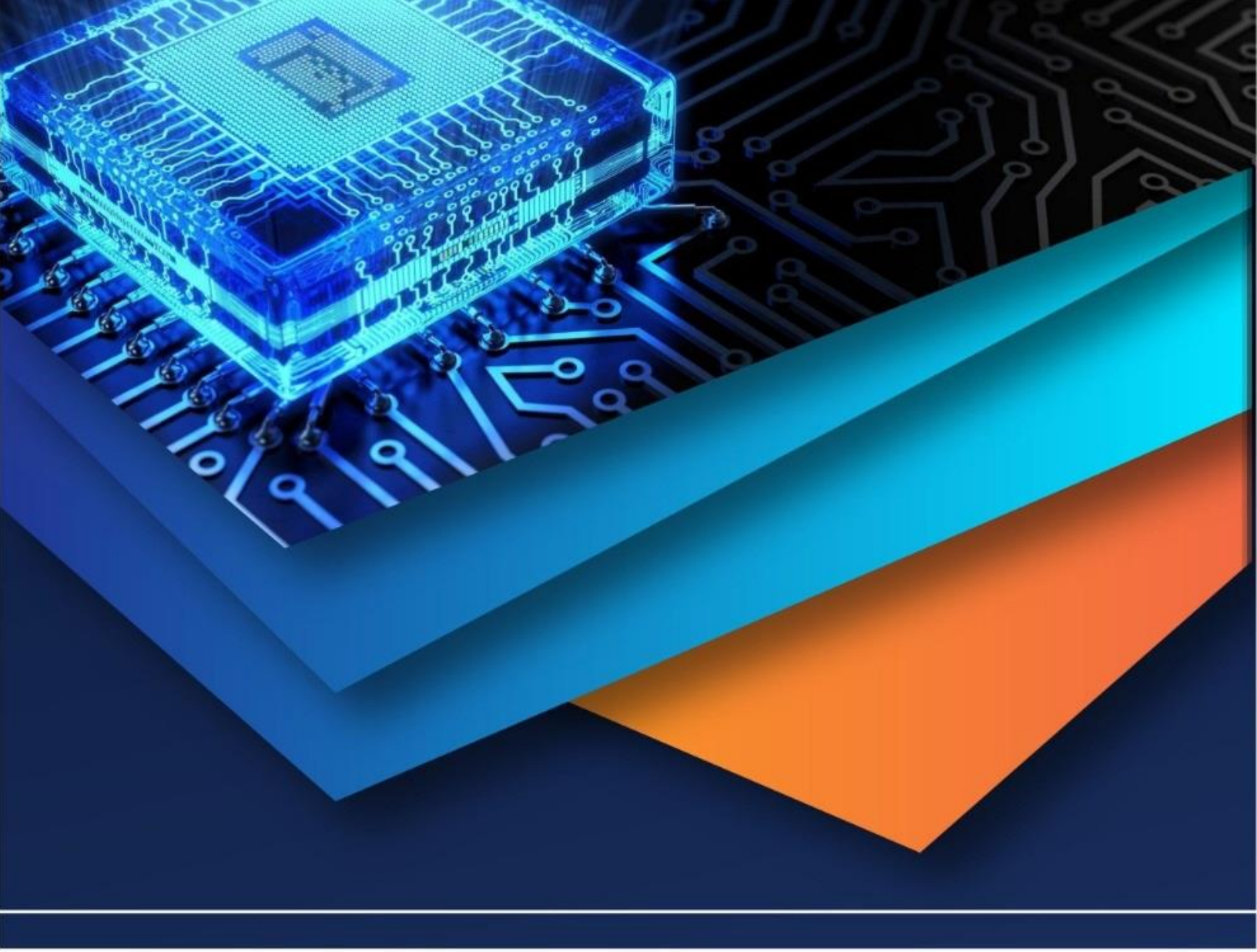
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