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An overview on GMP requirements for hair care products

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Abstract
Hair is a distinct feature of mammals that serves a variety of tasks. While hair may appear to be a simple structure, it is actually a complicated element of the anatomy whose biology is only partially understood. Hair develops from tiny follicles within the skin's complex microenvironment. A hair follicle issue occurs when the features of hair development deviate from the usually recognised norms for a certain population, whether specified by gender, age, race, and/or culture. Shampoo is typically used to clean the hair and scalp in an efficient but gentle manner. However, over time, shampoo has come to be seen as a cosmetic product that also serves to maintain the health and beauty of the hair by adding gloss and making it easier to manage. Conditioner, Gels, Spray, waxes, dyes, colours, bleaching, and many other products are also helpful.
In order to guarantee that goods are consistently manufactured and regulated to the quality standards relevant to their intended use and as required by the marketing authorisation, good manufacturing practises (GMPs), a subset of quality assurance, are used.
To ensure that cosmeceutical products meet the standards for safety, purity, integrity, quality, and composition, GMPs should be adhered to during the manufacturing, storage, packaging, handling, and distribution processes. This review article discusses the composition of hair, hair care recommendations, and certain specifications that product manufacturers must adhere to in order to produce items of the greatest quality.

Keywords: Hair, hair products, GMP, production, documentation, specific requirements

Introduction
Human hair on the scalp is a highly noticeable characteristic that plays a role in social and sexual indication, is frequently a reflection of a culture or personal style, and provides important data for forensic and scientific examinations. Research on the variety of human hair types is generally important to people who study human evolution and human biology since it is a significant aspect of current human development. A person's scalp and different populations might have different morphologies of hair fibers, which are intricate, multilayered structures [1].
Having good hair is a sign of health, youth, and vigour for both men and women. Hair has evolved to fulfill defensive and evolutionary purposes in animals. A person's hair and color, or lack thereof, may significantly affect their perceived social significance as well as their emotional and psychological well-being, even if from a biological standpoint, hair in humans may not be crucial for protecting the skin barrier [2].
Africans, Asians, and Europeans are the three traditional ethnic human categories according to which human hair is often categorized. However, a recent study found that by measuring three easily measured parameters-curve diameter, curl index, and number of waves-it is possible to categorize all the different hairs found throughout the world into eight the primary coherent hair types [3].
While the integrity of the hair ends is related to the hair cortex, the texture and shine of the hair are related to its surface properties. Our identity depends on the inherent variances in our hair, which might be straight, wavy, curly, blonde, black, brown, red, or white [4].
Cosmetics come in a wide variety of forms, including cream, lotions, fragrances, skin-cleansing treatments, and ornamental cosmetics. The Greek term "kosmtikos," which meaning to be able to organize and decorate, is the source of the English word cosmetic.
The definition of cosmetics in India, as per the Drugs and Cosmetics Act 1940 and Rules 1945 Cosmetic is defined as an article meant to be rubbed, sprinkled, poured, or applies to the part

of the human body or for cleansing, beautifying, enhancing attractiveness, or altering the looks [5].

Shampoos, hair colors, bleaching chemicals, and lotions for straightening hair all include frequent contact allergens. These can cause allergic contact dermatitis, particularly in hair stylists, but also in clients and other people who use hair care products at home [6].

Around the world, there are numerous regulatory bodies that each has their own set of rules and regulations for the regulation of cosmetic products.

Cosmetic Regulation in India

The Drugs and Cosmetics Act 1940 and Rules 1945 as well as Labeling Declarations by the Bureau of Indian Standards (BIS) govern cosmetic items in India. The Drugs and Cosmetics Rules of 1945's Schedule 'S' items are subject to cosmetic criteria defined by BIS. Use of cosmetics comprising dyes, colors, and pigments other than those listed by the Bureau of Indian Standards (IS: 4707 Part 1 as modified) and Schedule Q is subject to limitations outlined in Rule 134 of the Drugs and Cosmetics Rules [7].

A quality product is helped to be ensured by good manufacturing practice (GMP), a production and testing procedure. GMP recommendations are not rigid rules on how to produce goods. A number of general guidelines that have to be followed during manufacturing must be included below. A corporation may be able to meet GMP criteria in a variety of ways while putting up its quality programme and manufacturing process. Finding the best and most efficient quality procedure is the duty of the firm [8].

Anatomy and physiology

Hair is an epidermal derivative. Externally, hair is composed of thin, malleable tubes of dead, fully keratinized epithelium cells, whereas internally, it is composed of single living follicles of hair, cylinder-like epithelial down growth into the dermis, and subcutaneous fat, all of which expand at the base into the hair bulb that surround the mesenchymal derived dermal papilla. Hair has two distinct structures: the follicle under the skin and the visible hair shaft on the body surface [3].

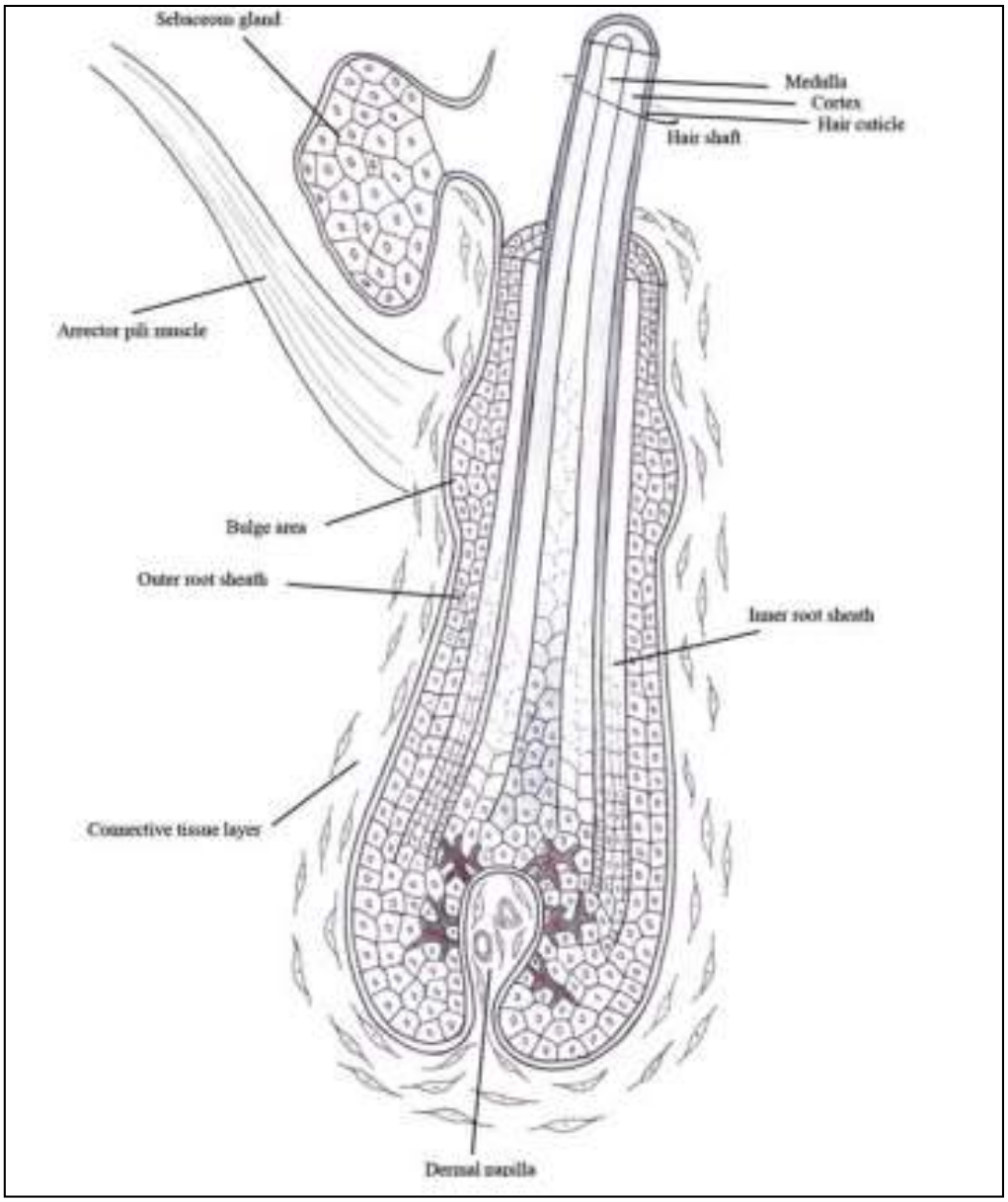

Fig 1: Anatomy of Hair and hair follicle [1]

The cylindrical structures or shafts of hair are constructed of densely packed cells and develop from follicles, which are tiny sac-like organs. Individual hair shafts in men can be anywhere from 15 and 120 pm in diameter, depending on the type of hair and the area of the body where the follicle is situated.

Keratin creates long fibers in the hair shaft that are chemically cross-linked with other proteins and replaced with S-S bonds to generate very tightly connected fibres. The outcome is a very robust and sturdy structure [9].

A multicellular mini organ termed a hair follicle (HF), which is invaginated under the skin's surface, houses the base of each hair shaft (HS). Thermoregulation, both physical and immunological defense against external assaults, sensory perception, social interaction, and camouflage are just a few of the many activities performed by the HF. Additionally, the HF serves as a storage location for multipurpose stem cells (SCs) that may regenerate all skin lineages [10].

The medulla, the cortex, and cuticle are the three primary concentric areas that make up every individual hair shaft throughout the growing period.

The deepest layer, the medulla, is made up of translucent cells and air gaps that varies depending on the kind of hair. On light microscopy, it is frequently challenging to distinguish and occasionally may not be present at all. Glycogen-rich vacuoles and citrulline-containing medullary granules can be found in the cells that make up the medulla [2].

The cortex is made up of densely clustered, spindle-shaped cortical cells that are filled with parallel-to-the-hair-shaft-longitudinal keratin filaments. There are many cysteine residues carrying sulphur in the keratin chains. A robust crosslink between neighbouring keratin chains is created when cysteine residues in nearby filaments of keratin form covalent disulfide connections. The form, stability, and texture of the hair are greatly influenced by the disulfide connections. When the hair is wet, these disulfide bonds are still present, permitting the hair to regain its original shape [4].

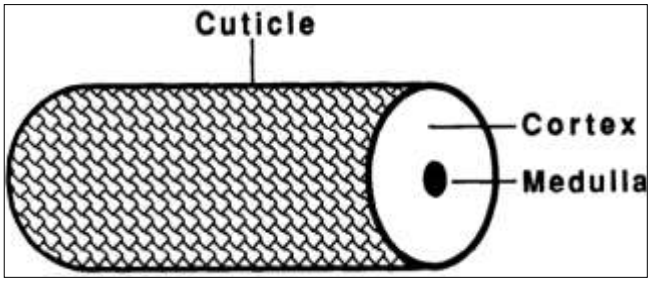

Fig 2: Cross section of Hair shaft showing medulla, cortex and cuticle [2]

The cuticle, a barrier defending the underneath cortex from injury from the environment, encloses the hair fibre. It has 6–10 layers of scales that overlay one another such that only about 1–6th of every surface is visible. The distal open end of the overlaying tiles points to the tip of the fibre, while the proximal end of the cuticle is securely linked to the cortex. In connection to one another, adjacent hairs develop and migrate outward, allowing dirt and scales to be more easily elevated and removed. The cuticle cells' form and direction are what prevent excessive friction between hair fibres [11].

Disorders

While they can be a sign of a more serious condition, hair disorders do not necessarily pose a life-threatening threat. A hair issue might be a symptom of serious health risks, such as toxic toxin-induced hair loss, hormonal abnormalities caused by tumour secretion, or severe inflammation like that seen in systemic lupus erythematosus.

So, whether or not a hair disorder is found relies in part on the genetics and cultural upbringing of the person in question. The most accurate way to describe a hair follicle issue is to say that it occurs when the features of hair development are abnormal compared to the norm for that group, which may be determined by gender, age, ethnicity, or culture. It has grown into a global business to correct hair abnormalities, whether they are actual or just imagined [12].

Strong, thick scalp hair has traditionally been a symbol of youth, beauty, health, and vigour. Insecurity is a side effect of any form of hair growth disturbance. Typically, the complaints may be categorized into three groups:

1. hair loss;
2. enhanced hair growth; and
3. Disturbances in hair quality.

In clinical practice, active loss of hair (effluvium) and/or decreased hair density (alopecia) account for the vast majority of patients' presentations [13].

A. Hair loss

- Male Pattern Baldness (Androgenic Alopecia) [14]
- Telogen effluvium [15]
- Trichotillomania [16]
- Areata alopecia [17]
- Traction alopecia [18, 19]

B. Increase in hair growth

- Hirutism [20]
- Hypertrichosis [21]

Hair care products

Alopecia and scalp treatments are more likely to be adhered to by patients with the help of hair cosmetics [22].

For proper hair moisturization and to keep the scalp clean, hair care products are needed [23]

Two broad groups of hair cosmetics can be distinguished:

1. Products for the hair that have a temporary impact, such as shampoos, conditioners, sprays, and transient colors;
2. Hair-shaft-altering cosmetics like bleaches, relaxers, and dyes with permanent results, such as permanent waves [24].

Shampoo

Definition

A shampoo is a preparation of a surfactant (i.e. surface active material) in a suitable form – liquid, solid or powder – which when used under the specified conditions will remove surface grease, dirt, and skin debris from the hair shaft and scalp without adversely affecting the user [25].

The most popular method for treating hair and scalp issues is shampoo treatments.

The following are shampoo's most significant impacts on hair

- Lubricating;
- Absorption and/or penetration into the hair; and
- Washing, oil elimination, and lipid regrowth [26].

Garnier Whole Blends Legendary Olive Replenishing Shampoo

Fig 3: Light weight shampoo [57]

The word "shampoo" is derived from a Hindi phrase that means "to massage," and shampoos are liquid cleaners [27].
The objective is to get rid of the undesirable build up without removing so much sebum that the hair becomes unmanageable [28].
Conditions that are mostly affected by the use of aggression shampoos are: Difficulty in untangling the strands, and the frizz effect. Attrition, the main cause of frizz, can be minimized by adequate formulation of cleaning products [29].

Ideal properties of a shampoo

1. It should effectively and completely remove dust or soil, excessive sebum or other fatty substances and loose corneal cells from the hair
2. It should generate a sufficient amount of foam to meet the user's psychological needs.
3. When rinsed with water, it should be simple to remove.
4. It should leave the hair manageable, soft, shiny, and non-dry with little to no fly a ways.
5. It should give the hair a pleasant scent.
6. It shouldn't have any negative effects or irritate the eyes or skin.
7. It shouldn't dry out and chap the hand.

Types of shampoos

Shampoos are of the following types

- Shampoo with conditioner (2 in 1 shampoo)
- Baby shampoo
- Sulphate free shampoo
- Dry shampoo
- Shampoo bars
- All natural shampoo
- Everyday shampoo
- Professional shampoo
- Color protect shampoo
- Medicated shampoo
- Baby Shampoo [25]

The most popular method for treating hair and scalp issues is shampoo treatments.

Table 1: Contents in a shampoo and their examples [27]

Category	Ingredients
Surfactants	Alpha olefin sulfonate, sodium lauryl sulphate, ammonium lauryl sulphate, and ammonium laureth sulphate
Thickeners	Natural gums, cellulose derivatives, and electrolytes
Sequestering agents	EDTA
Other (for product appeal)	perfume oils, colours, menthol, liquid crystal concentration, and fragrance
Additives	foam stabilisers, polyacrylate-based lubricants for controlling viscosity, and dispersants
Humectants	Glycerin, sorbitol, glycerol, propylene glycol, and polyethylene glycol
Moisturizers	Alkanolamides, natural oils
Preservatives	Parabens
UV absorbers	Benzophenones
Buffers	Sodium citrate
Anti-dandruff agents	Zinc pyrithione, ketoconazole, piroctoneolamine, ciclopiroxolamine, and selenium disulfide

Hair conditioner

TRE Semmé Keratin Smooth Color Shampoo and Conditioner

Fig 4: Color-protecting shampoo and conditioner [57]

After shampooing, hair conditioner is a hair care product used to condition the hair. Your hair will be preserved and restored with conditioning. It functions by rehydrating the skin and softening the hair follicles' cuticles. [30]

The way conditioners function is by lubricating the cuticle, which decreases the hydrophobicity of the fibre, and by delivering positive charges to the hair fibre to counteract its electrically negative charge. Polymers, oils, waxes, hydrolyzed amino acids, and cationic compounds are among the lubricating and anti-static elements that they contain. The most efficient and well-liked conditioner ingredient is a silicone.

Cationic surfactants including cetyltrimethylammonium chloride, behentrimonium, propyltrimonium, and stearamidopropyl dimethylamine are among the most often used components in conditioners.

The hair shaft flaws are filled with polymers like mono and polypeptides like hydrolyzed proteins (amino acids), polypeptides produced from collagen, and polyvinylpyrrolidone (PVP), which are cationic in nature and create a smooth surface to promote shine while removing static electricity [29].

The most popular silicone in hair care products is dimethicone, which has the effect of shielding the hair shaft from harsh effects [31].

The conditioners have the following functions

- Increasing combability.
- Mirror the hair's natural lipid outer layer: 18-MEA
- Bring hydrophobicity back.
- Remove the negative charge from the net in order to seal the cuticle and avoid or lessen frizz and friction.
- Enhance smoothness, gloss, and manageability [32, 33].

Hair oil

Moroccan oil Treatment Light Hair Oil

Fig 5: Hair oil [60]

One of the best natural nutrients for hair is coconut oil. It contributes to the lustrous, healthy growth of hair. It is also quite good at preventing protein loss, which can cause your hair to grow in many unattractive or unhealthy ways. In the Indian subcontinent, coconut oil is widely used for hair care. It is a top-notch conditioner that aids damaged hair in growing again.

According to studies, coconut oil offers hair stronger defense against fatigue-related hair damage. Even if your scalp is habitually dry, you can prevent dandruff by frequently massaging your head with coconut oil. Additionally, it aids in preventing lice and their eggs from landing on your hair and scalp. Coconut oil is edible oil made from the kernel of mature coconuts that have been picked from the coconut palm. This oil is said to offer several health advantages [34].

Oils play an important role in protecting hair from damage. Some oils can penetrate the hair and reduce the amount of water absorbed in the hair, leading to allowering of swelling [35]. Ruetsch *et al*. showed that coconut oil penetrates into the hair cortex and reduces the swelling of the hair fiber [36].

For particular for hair care products, coconut oil in micro emulsion is a better alternative to standard practice since it may contain bioactive compounds with a stable regulated release property [37].

Use of Hair Tonic oil

Raw cotton is used to apply the oil to the hair, which is then left on for up to 24 hours before being washed with water [38].

Small oil drops are included in the formulations of hair- and skin-care products, improving softness and conditioning hair and skin [39].

Hair colourants

The Egyptians were aware of the practise of hair dying as early as 5000 BC [40].

Hair dye has been used since ancient Egyptian times when Rameses II reinforced red hair color using henna [41].

Example of vegetable dyes used as hair colorants are:

- Henna
- Madder
- Chamomile
- Walnut
- Turmeric
- Onion skin
- Eclipta alba
- Guaiac wood
- Red Sandal wood
- Brazilian wood
- Annatto [42]

Types of colourant

The primary distinction between the dyes is their ability to penetrate the brain and remain there permanently or not penetrate the cortex and remain shallow on the cuticle surface [42].

Permanent Hair Colorants

They are sometimes known as permanent hair colourants since their effects persist longer than those of semi-permanent hair colourants. Because of their durability and capacity to lighten the darker natural colour, permanent hair colours are the most often used hair colours. The coloration is irreversible, and the white hair that appears 10 to 15 days after application is not a result of the dye shampoo being washed out but rather is the result of fresh hair growth [43].

Revlon Color Silk Beautiful Color Permanent Hair Color

Fig 6: Home hair color [57]

Permanent colors include oxidation dyes like p-phenylenediamine and p-tolulenediamine. The colours stay permanently embedded in these polymers, which are very difficult to remove [42].

Phenols such as resorcinol, pyrogallol may be used to modify shades. The main ingredients of a formulation will be of:-

a) Base: Solution, emulsion, gel, powder, shampoo.
b) Dye: Oxidation base
c) Alkali: Ammonia
d) (d)Antioxidants: Ammonium thioglycolate.

Semi – permanent coloring

These colorants give a stronger coloration to the hairs and can withstand six to eight subsequent shampoos although some of the color is removed during each shampoo. These are made of dyes having smaller molecules which penetrate the hair easily.

These colorants are mainly based on basic dyestuffs of nitro-amino dyes. The most important nitro dyes are picramic acid (2,4-dinitro-6- aminophenol) and 4-nitro-1-2-phenylene diamine. These dyes are usually red or yellow. Brown dyes are normally larger in size and do not penetrate easily [44].

Temporary colorants

These dyes or colorants impart color to the hair for a short time. They are washed off during the first shampoo.

Present-day temporary colorants are based on this principle and consist of a mixture of a suitable dyestuff with an acid either in powders or in liquid forms [45].

Bleaches

Hydrogen peroxide, rarely at quantities above 12%, is the main ingredient in almost all bleaches. Solutions of hydrogen peroxide must be acidic and typically contain additional stabilizers in order to be stable. Since the peroxide must decompose in order to bleach by oxidation, the extra stability provided by the acid medium reduces its efficacy as bleach. Heat has the effect of speeding up the bleaching process. These kinds of acidic solutions are used as spray-in treatments (non-aerosol), whose mild bleaching impact is amplified by using a hair dryer or by heat from the sun.

A stronger effect is achieved by mixing the peroxide solution with ammonia solutions just prior to application. This increases the alkalinity. If the final blend is in the form of a lotion, cream or gel, it is much less likely to drip or run and is easier to use. Mixing per-salts, such as ammonium or potassium persulphate, with the ammonia bleach may result in an even greater bleaching activity. Strong hair bleaching is a tough procedure that shouldn't be done too frequently [43, 44].

The main working principle of the lightener is the breakdown of melanin granules through hydrogen peroxide of powder-bleach is stronger [46].

Hair creams

Thick emulsions or unctuous masses that are applied to the hairs are known as hair creams.

It is typically white, off white, or evenly colored and it may or may not be scented.

The basic purpose of using hair creams is to condition the hair by 'moisturizing'. Hair creams can be either water-in-oil or oil-in-water [44].

Fig 7: Hair cream [57]

The maximum alliin penetration rate for garlic oil, which is required for the treatment of hair fungal infections, is achieved when a herbal hair cream is made using the non-ionic surfactant mixture of span 60 and brij 58 with a concentration of 4% [47].

Fig 8: Hair smoothing cream [57]

Hair fixers

The preparations which hold the hair in style for a long period of time are called Hair Fixers.

They include Hair Setting Lotions, Sprays and Hair Dressings.

A. Setting Lotions

These are made to support and keep the temporary setting of hair maintained for a long time. These lotions are given to the wet hairs to set the setting [44].

Aqueous or hydro-alcoholic dispersions of vegetable-based polymers, such as Arabic gums, were once used as hair fixatives. To apply these solutions to the moist hair, combs were dipped in them. The next generation came with squeeze bottles or atomizers for packaging shellac solutions. The hairstyle industry was changed when aerosols were developed to deliver resins that could be removed with soap [24].

B. Hair Sprays

Hair lacquers and sprays are designed to keep the hairstyle firmly in place. After combing and styling the hair, hair spray is always used. Therefore, the purpose of a hair spray is to deposit an imperceptible film over the hair in order to protect the hairstyle from any external factors that can alter its ideal characteristics [47].

The dried film of the day's hair sprays needed to be robust, transparent, simple to plasticize, and water-resistant while also resisting gravitation force. Because it tended to flake and was often quite combustible, shellac was difficult to remove [24].

Fig 9: Hair sprays [57, 59]

Hair gels

Due to the higher volume of substance applied to the hair shaft, they offer more hold than hair sprays. The two types of hair gels that are sold commercially are styling gels and sculpting gels; styling gels provide fewer grips than sculpting gels do.

Carboxyvinylpolymers, mostly used to produce transparent gel bases.

The clarity in solution, high water solubility, and compatibility with carbomer resins are the fundamental criteria [44].

Fig 10: Hair Gels [57]

Styling preparations

Hair Straightening

Chemical relaxers are the name given now to hair straightening products, and the results are long-lasting. The solution's high pH (9.0–14.0) causes the hair to expand and the cuticle scales to open, allowing the alkaline agent (OH−) to permeate into the hair fibres all the way to the endocuticle. The product's reaction with keratin breaks and rearranges the disulfide bridges, causing the spiral keratin molecule to become soft and stretched [22].

Burns to the scalp and breaking of the hair are the primary side effects of hair straightening [49].

For people with naturally curly or wavy hair, there are numerous methods for straightening it out, including-

- Mechanical straightening,
- Heat straightening, and
- Chemical straightening [50].

Table 2: Hair Straighteners [51]

Type	Technique
Mechanical	Pomade applied to hair
Heat	Hot comb or heated iron applied to hair with or without pressing oil.
Chemical	Thioglycolate curl relaxer Bisulfite curl relaxer Sodium hydroxide curl relaxer

Fig 11: Hair Straighteners [58]

What is Carbocysteine?

Carbocysteine is a compound named glyoxyloyl carbocysteine or oxoacetamide carbocysteine.

Carbocysteine is a mucolytic substance that has no impact on the keratin in hair and is created by alkylating cysteine with chloroacetic acid. Glyoxylic acid, cysteine, and acetic acid are all components of the substance known as carbocysteine hair treatment. Glyoxylic acid acts like an aldehyde in its reactions, despite the aldehyde being a very tiny component of its solutions, and is regarded as a sensitizer and harmful chemical [52, 53].

We may infer that carbocysteine is not created as a hair-straightening agent on its own; rather, it is combined with an aldehyde, such as glyoxylic acid [54].

A few further STYLING preparations are:

- Hair-setting lotions (or) hair-styling lotions,
- Glazes (or) Hair styling creams,
- Hair oils/ Brilliantines/ Pomades/ Styling Waxes [44]

Fig 12: Hair styling cream [57]

Permanent waving

Permanent waving's chemistry is based on the dissolution of the hair disulfide bonds that give hair its flexibility and their reestablishment once the hair has been given a new shape. Acid solutions, alkaline solutions, and sulfite-containing solutions are among the waving-lotion types that can cause disulfide bond breakage. (Table-3) [55]

Table 3: Permanent Waves [55]

Type	Advantages	Disadvantages
Acid Body-heat processed. Externally applied-heat processed. Self-regulated. Exothermic or self-heating.	Hair remains soft, manageable; Less odoriferous. Rapid processing. Will not over process. Heat produced as a by-product.	Loose curl produced. May be allergenic. Increased scalp irritation. - -
Alkaline	Long-lasting, tight curl produced.	Harsh on hair;
Sulfite	Lessodor, less hair-shaft damage, safely used at home.	Loose, short-lived curl produced.

Hair that has been permanently waved, permed, or curled indicates that the setting does not significantly alter even after several shampooing and drying procedures. Due to the fact that hair is always growing, however, permanent waving is not actually permanent [44].

Permanent waves are used to create curls or alter curls that have already formed. Safety is established by choosing substances that are non-irritating and safe, and the product must adhere to good manufacturing practices and quality assurance standards [56].

GMP-good manufacturing practices

Fig 13: Components of GMP [66]

The definition of cGMP in layman's words is: "that aspect of quality assurance that guarantees goods are consistently manufactured and regulated to the quality standards acceptable for their intended purpose and legal requirements. Therefore, cGMP addresses manufacturing and quality control issues. "The production and distribution of high-quality pharmaceutical goods is the primary goal of any pharmaceutical organization. From choosing suppliers for the initial supplies and packaging supplies to distributing final goods on the market, this is a pretty drawn-out procedure. cGMP addresses every action at every level of the manufacturing process; it is unquestionably not only for production.

The sole method for creating and distributing high-quality pharmaceutical items for human consumption is cGMP. It examines several areas of production, which go much beyond simple housekeeping and record maintenance, as was once widely believed [61].

GMP regulations guarantee that cosmetic items are regularly made to a high grade and that the defined quality standard is satisfied. The Food and Drug Administration (FDA) coined the phrase "good manufacturing practise" (GMP) in 1962.

United States Drug Administration's current good manufacturing practices effort. GMP is a succinct acronym for the standards for ensuring the cleanliness of industrial operations. These recommendations offer basic standards that

a producer must fulfill to guarantee that their goods are continuously of excellent quality, through batch to batch, for its intended application.
To safeguard the customer, each business has unique GMP regulations, nevertheless.
The cosmetic GMP (Also known as cGMP) regulations are based on those utilized by the pharmaceutical sector and currently accepted globally. They ensure that cosmetic items are produced in a safe and high-quality manner.
Additionally, the GMP-quality management system (QMS) guarantees adherence to the standards set by health authorities across the world [62].

Key principles of CGMP in cosmetics
The final user shouldn't be harmed by the product.
The product must be clean and devoid of impurities.
It is important to have well-defined manufacturing processes that have been shown to produce goods of a constant quality.
Records of the production process that show the product was manufactured in line with these predetermined arrangements must exist.
The staff should be capable of doing their jobs and possess the necessary training. Equipment used in manufacturing should be maintained in a fit-for-purpose state.
The final product's quality cannot be checked.
The first of these rules-that the product shouldn't hurt the customer-is the most important. The goal of all the additional guidelines and specific standards is to guarantee that the product is secure for usage [63].

Scope
To provide rules for the manufacturing, management, storage, and delivery of cosmetic items. These recommendations cover the quality elements of the product, but they do not address overall issues with worker safety or environmental protection [64].

Premises
Building and Facilities: Verify whether-
Buildings used for the production or storage of cosmetics have the right size, shape, and construction to allow for the unhindered positioning of equipment, organised material storage, hygienic operation, and adequate cleaning and maintenance.
Smooth, readily cleanable surfaces are used to build the floors, walls, and ceilings, all of which are maintained clean and in good condition.
Fixtures, ducts, and pipes are set up such that drips or condensation won't contaminate bulk completed goods, cosmetic ingredients, utensils, or equipment surfaces that come into contact with cosmetics.
For the planned functioning and the comfort of the staff, lighting and ventilation are adequate.
For hygienic operation and maintenance of facilities, equipment, and utensils as well as to meet staff demands and promote personal hygiene, there is enough water supply, washing and toilet facilities, floor drainage, and sewage system [65].

Organization, qualification and personnel
The company's organizational structure must be such that the production and quality control departments are led by separate individuals, neither of whom shall be responsible for both be accountable to one another.
The production manager has to have sufficient training and expertise in the creation of cosmetics. He should be given the power and accountability to oversee all aspects of product manufacturing, including operations, tools, workers, workspaces, and records.
The head of quality control should have the necessary education and practical expertise. He should be given complete power and accountability for all actions.
Establishing, confirming, and putting into practice all quality control processes are examples of control responsibilities. He should have the power to designate or assign personnel as necessary, to approve bulk and finished products, starting materials, intermediates, and other items that must meet specifications, and to reject any items that do not meet those specifications or that were not produced in accordance with established procedures and guidelines.
Key individuals should have their roles and levels of authority established. Direct supervision should be carried out by a sufficient number of trained individuals in each department of the manufacturing and quality assurance unit [64].

Equipment
Equipment used in manufacturing should be able to produce materials, goods, and intermediates that are intended and meet the needed or stipulated quality standards. The machinery needs to be developed and designed in such a way that it can be completely cleaned. Surfaces that come into touch with goods should be smooth, polished, and free of any dead legs, projections, tough corners, uneven joints, or rough welds that might harbour contaminants or be challenging to clean. Additionally, the equipment must be able to survive frequent, meticulous cleaning. In the production of pharmaceuticals, traces of prior product at concentrations that would be acceptable in other sectors are wholly inappropriate. All production equipment needs to be thoroughly cleaned, disinfected, or sterilised in between batches [66].

Starting and packaging materials
The materials are handled in accordance with written instructions. All components must adhere to specifications and have a constant level of quality.
In terms of content (substance and amount), the clean containers are correctly labeled together with the batch number. Before releasing any beginning materials for production, they should all be sampled for conformity with the specification.
There should be little chance of mistake if the items are correctly labeled and kept.
The water that will be utilized must undergo routine microbiologic testing for bacteria.
There must be no pathogenic microbes present.
The company is decided by the greatest number of germs that may be found in the items [62].

Labeling
Cosmetics packaging must comply with the Fair Packaging and Labelling Act, which mandates that the net quantity of the contents be labeled on the main display panel in weight, numerical count, or measure, as applicable. It is necessary to provide the weights in pounds, ounces, or gallons. Additionally, the outer container must only declare the net quantity of the contents, which must be expressed in the

metric system of weights and measures. A cosmetic product marketed to a customer must have a label on the exterior container or wrapper that lists all the components in decreasing order of predominance. All contents, active substances first followed by inert ingredients, must be listed on the exterior of the container if a product is both a cosmetic and a medication (OTC). On the immediate container, just the active medicinal ingredients must be visible [67].

Production

Every step in handling materials and products, including receiving and cleaning them, quarantining them, sampling them, storing them, marking them for use, processing them, packing them, and distributing them, should be done in accordance with written protocols or instructions and, if appropriate, be documented.

It is best to follow instructions or procedures exactly as they are written. If deviations do occur, they should follow a protocol that has been approved. When necessary, the QC department should be involved and the authorisation of the variation should be granted in writing by a designated individual.

All products, bulk containers, huge pieces of equipment, and, where necessary, the rooms and packing lines being utilised, should always have labels or other forms of identification that state the product or material being processed, its strength (if relevant), and the batch number. This signal should, where appropriate, also include the stage of manufacturing. In some circumstances, it could be helpful to note the name of the prior processed product as well.

The production area is often where in-process controls are carried out. Such in-process controls shouldn't compromise the products quality or a different product in any way (such as by cross-contamination or product mix-up) [68].

Batch Numbering System

- Every final product must have a manufacturing identification number, which allows the product's history to be tracked.
- In order to prevent misunderstanding, a batch numbering scheme should be distinctive to the product and shouldn't be used more than once for the same product.
- The batch number should, whenever possible, be printed on the product's immediate and outer containers.
- It is advisable to keep track of batch numbers.

Weighing and Measurement

- Utilizing calibrated equipment, weighing should be done at the designated locations.
- Every measurement and weighing procedure should be documented and, if necessary, counterchecked.

Procedure and Processing

- All raw materials must meet requirements, and all production processes must be carried out in accordance with written instructions.
- All necessary in-process controls must be performed and documented.
- Where applicable, bulk products must be correctly branded up until Quality Control approval.
- Cross-contamination is a problem that needs to be addressed carefully at every level of processing.

Dry Products

Dry products and materials handling need extra care. Employing a central hoover system, a dust-containing manufacturing system, or other relevant techniques should be done whenever possible.

Wet Products

- Liquids, creams, and lotions should be manufactured to guard against microbiological and other contamination.
- It is advised to employ closed systems for manufacturing and transfer.
- When ingredients or bulk items are delivered via pipelines, care should be taken to make sure the systems are simple to clean [71].

Records

Both paper and digital records should be retained. The operations, processes, explanations for following unconventional steps, directives (including training), protocols, reports, methodology, safety precautions, corrections, and other measures should all be meticulously documented in the records.

To check if raw materials are sufficiently regulated, you should analyse raw material records.

These documents may include ones related to the things that were received, examined, tested, used, and disposed of.

You should check to see if the disposition of returned or rejected materials is documented.

Should evaluate batch production control records, which should include-

Documentation of all production steps, such as processing, handling, transferring, holding, and filling; documentation of all ingredients supplied to the batch, including name, code, lot number, quantity, etc.; and

- Steps for monitoring, managing, and altering in real time
- Lot or batch numbers for the finished product;
- Control status for the finished product, such as acceptable or rejected

It is important to review the laboratory control records for raw materials, in-process materials, and finished goods. These records should include documentation of sample practises, test results, and test result interpretation (accepts or rejects).

You should determine if there are enough records to execute a recall effectively. It is necessary to keep records of the initial distribution that include the consignee, the product, and the lot or control number.

You should check to see whether records are made promptly after an incident to verify if they were [71].

Raw materials

To verify that raw materials adhere to the necessary norms and specifications, you should ascertain how they are recognized, kept, examined, tested, inventoried, handled, and regulated. Raw materials in particular should:

- Handled and stored in a way that avoids errors (such as selection or mix-up errors), microbial contamination, and degradation due to exposure to extreme environmental conditions (such as heat, cold, sunshine, moisture, etc.)
- Stored off the floor in airtight containers.
- Kept in containers that are marked with the owner's name, the lot number, and the type of control (release or quarantine).

Prior to processing or usage, materials should be properly identified, controlled, and sampled to check for conformance to specifications and the absence of filth, microorganisms, and other adulterants (materials of animal and vegetable origin and those produced by cold processing methods should be checked for filth and/or microorganism contamination).

Water

You should determine whether

Whether the water used as a cosmetic ingredient is utilized directly from the tap or if it has been processed (e.g., by the use of deionization, distillation, or reverse osmosis) before use.

The entire system for supplying water used as a component in cosmetics is made to reduce the possibility of contamination and stagnation. There are established procedures for making sure that the water used as a cosmetic ingredient:

- It should be of defined quality;
- Is not impacted by materials used in the water treatment equipment;
- Is being tested or monitored regularly to make sure that it complies with applicable chemical, physical, and microbiological specifications for quality.

Color Additives

you should check 21 CFR parts 73, 74, and 82 to see if colour additives are permitted to be used in your particular cosmetic items. If a cosmetic contains an unlisted colour additive, a petition for a new colour additive must be approved in accordance with 21 CFR sections and 71. You may find a summary chart for colour additives on the FDA website. According to 21 CFR 70.25(d) (see exception below4), colour additives that are subject to certification must be labelled with the lot number provided by the Colour Certification Branch3.

Prohibited and Restricted Cosmetic Ingredients

While certain substances have restrictions on their use, others are not permitted in US-marketed cosmetics. The following tables list the ingredients whose use is restricted or forbidden. You should check the CFR, in particular 21 CFR part 700, Subpart B, for any additional restrictions pertaining to specific cosmetic products or their ingredients that might have been added to the FDA's rules in addition to the prohibited and restricted ingredients listed in the preceding tables [69].

Table 4: Restricted cosmetic Ingredients [69]

Restricted Cosmetic Ingredients	CFR Citation
Mercury containing compounds	21 CFR 700.13
Hexachlorophene	21 CFR 250.250

Documentation

Introduction

- The documentation system must keep track of all maintenance, storage, quality control, primary distribution, and other GMP-related duties that have been done for each batch, from raw materials to finished items.
- There should be a method for preventing the use of any superseded document.
- If an error is made or identified on a document, it should be rectified such that the original entry is not lost.
- The correction should be made near to the original entry, initialled, and dated.
- Each step in documents with instructions needs to be described in detail.
- Documents must be signed, dated, and made available to the right individuals.

Specifications

Each specification needs to be approved by qualified staff.

The following information should be included in the specifications for raw and packaging materials:

a) the material's name
b) a description of the material
c) testing conditions and acceptability limits
d) Technical diagrams, if appropriate.
e) Any additional safety and storage precautions that may be required.

Bulk and completed product specifications should include

a) The name of the product
b) A brief description
c) A list of the product's physical characteristics
d) The results of any relevant chemical and/or microbiological tests, along with the acceptable limits for each.
e) Storage conditions and any necessary safety measures

Documents for Production

Master Formula

Production Documents

Master Formula

On request, the Master Formula need to be made available. The following details ought to be included in this document:

(a) The product's name and identification number.

Materials intended for packaging as well as storage conditions.

List of the raw ingredients used in (c).

(c) A list of the tools utilized.

(f) Where relevant, in-process controls with their processing and packaging

Batch Manufacturing Record (BMR)

(a) For each batch of a product, batch manufacturing records (BMR) should be created.

(b) Every BMR should have the following information.

- Name of the product.
- Batching formula.
- An overview of the production process.
- Code or batch number.
- Dates when processing and packaging began and ended; names of specific large pieces of equipment and production lines; and locations where they were used.
- Records of the adequate cleaning of processing equipment.
- Laboratory results, such as pH and temperature test records, and in-process control data.
- Records of packaging line clearance inspections
- Any sample carried out during different processing phases.
- Any investigation of a specific error or inconsistency
- Results of product inspections on packaged and labelled goods

Records for Quality Control

(a) It is important to keep records for all testing, assay results, and the acceptance or rejection of raw materials, intermediates, bulk materials, and completed products.

(a) These records could contain the following information:

- Date of test conducted.
- material identification
- name of the supplier
- Date of receipt
- Original batch number, if any Batch
- number of quality control
- received quantity
- sampling date
- Results of quality control [71].

Internal audits

You should check to see if proper internal auditing procedures are being followed. Internal audit procedures should at the very least state that:

- Internal audits take place on a regular basis or upon request.
- Internal audits are carried out by personnel who do not have direct responsibility for the subjects under audit
- All internal audit observations are assessed and communicated with the appropriate management, production, quality control, and/or lab employees.
- Internal audit follow-up verifies that corrective measures have been completed or implemented in a satisfactory manner.
- An internal audit entails a review and evaluation of all or a portion of a quality system with the aim of enhancing it.
- An external or independent team of experts, or a team assembled specifically by management, may carry out an internal audit.
- If necessary, these internal audits may also include vendors and contractors.
- After each internal audit is complete, a report should be made [69, 71].

Finished products

Before being released, all finished products must receive the approval of quality control [71].

Principle

The finished products must satisfy the specified acceptance criteria.

It is important to manage storage, shipping, and returns in a way that preserves the quality of final goods.

Release

Before being put on the market, all finished products should go through acceptability testing and control in accordance with the approved test protocols.

The authorized personnel in charge of quality control should release products.

Storage

The completed item must be kept in designated locations for the allotted amount of time in a suitable environment. If necessary, finished goods should be maintained under close supervision while being stored.

Storage areas ought to allow for organised storage.

Finished goods should be physically stored at the sites where they are approved, rejected, or released from quarantine, or in any other system that can offer the same level of assurance.

When such information is required to assure the product's quality, finished product containers should be identified by their.,

a) Name or identification code,
b) batch number,
c) Storage conditions.
d) Amount.

Measures should be implemented to ensure stock turnover.

If there are no special circumstances, stock rotation should ensure that the oldest stock released is used first.

To guarantee inventory accuracy and that acceptance requirements are satisfied, periodic inventory checks should be carried out.

Any significant disagreement should be looked into.

Shipment

It is important to take action to guarantee the delivery of the stipulated end product.

To maintain the quality of the finished product, safety measures should be adopted as appropriate.

Returns

Returns should be properly labelled and stored in designated areas.

To decide how to handle returns, they must be assessed against established criteria.

Before updating returns on the market, release should be issued [70].

Quality control

Introduction

A quality control system ought to be implemented to guarantee that cosmetics are produced under the proper circumstances and in line with SOPs. This will guarantee that the products contain the proper ingredients in the proper amounts and of the proper quality.

As part of the quality control process, starting materials, in-progress, intermediate, bulk, and finished products are sampled, examined, and tested. Environmental monitoring programmes, batch documentation checks, sample retention plans, stability studies, and maintaining precise product and material standards are all included, as needed.

Reprocessing

To make sure that the reprocessing techniques do not affect the product's quality, they should be assessed.

Returned Products

Products that have been returned should be marked and stored separately, either in a designated area or behind a movable barrier made of rope or tape.

Before being allowed for distribution, all returned goods must first undergo physical inspection and testing, if appropriate.

Rejected goods should be disposed of in accordance with the correct procedures.

Records of items returned must be documented [71].

Treatment of Out of Specification Product

Rejected bulk goods, finished goods, raw materials, and packaging materials

Individuals with the required authority should look into returned items or materials.

- Before deciding to remove or reprocess, the staff in charge of quality should give their consent
- Reprocessed goods, both finished and in bulk
- Reprocessing processes must be permitted and stated in
- Controls should be in place for the reprocessed finished items or bulk products.
- To ensure that the finished product or bulk product satisfies the acceptance requirements, authorized individuals should verify the results [70].

Waste management

Principle

Wastes must be eliminated quickly and hygienically.

Waste categories

Using information from production and quality control laboratories, the organization should identify the many waste types that can affect the quality of the produced goods.

Waste Flow

Waste flow shouldn't interfere with operations in the lab or the manufacturing sector.

The appropriate measures should be done with regard to waste collection, transportation, storage, and disposal.

Containers

Disposal

Waste containers must be properly tagged with facts about their contents and additional information as needed [70].

Waste containers need to be appropriately labelled with their contents and additional information as needed [71].

Subcontracting

Principle

It is recommended that a documented contract or agreement covering subcontracted activities be established, agreed upon, and controlled between the contract giver and the contract acceptor.

The objective of this stage is to purchase a product or service that meets the requirements of the specified contract provider.

This section relates to the subcontracting of the following

a) Manufacture;
b) Packaging; processing;
c) Analysis;
d) Cleaning and sanitization of facilities;
e) Pest control; and
f) Equipment and property maintenance.

Giver of the Contract

The contract provider must determine if the contract receiver has the resources and skills required to complete the mutually agreed-upon tasks. The contract maker must guarantee that the contract acceptor has all the tools necessary to fulfil the terms of the contract. The contract provider should assess, if needed, whether the contract recipient can adhere to these conditions in order to ensure that the activities can be carried out as planned.

Contract acceptor

The party accepting the contract is responsible for making sure they have the assets, the expertise they require, and qualified workforce satisfy the contract's requirements.

The contract recipient shall not, without the prior written authorization and approval of the contractor giver, assign any of the work assigned to them under the contract to any third party. There should be methods put in place between the third party and the contract acceptor to make sure that all operational information is delivered to the contract giver in the same manner as in the original contract.

Contract

Both the contract provider and the contract acceptor should negotiate an agreement outlining their respective responsibilities.

The contract provider must have access to all data or be provided with a copy [70].

Deviations

Only when there is sufficient evidence to support the decision may deviations from the established criteria be permitted.

To avoid the deviation from occurring again, corrective action should be taken [70].

Under the company's QMS, a procedure for managing deviations should be established and put into practise. The process must include QRM's guiding principles and should enable the proper identification and execution of corrective and preventive actions (CAPA) [72].

Complaints and recalls

Principle

All complaints that fall under the purview of these rules and are made to the plant must be evaluated, looked into, and given the appropriate amount of follow-up in order to determine the following:

For complaints:

- Find out if the company keeps a file of customer complaints and:
- The cause, extent, and body part involved in each reported injury.
- The product that caused each injury, along with its maker and code number.
- The name of the treating doctor and any pertinent medical procedures.
- The names and locations of any poison control centres, government organisations, medical
- Groups, etc., who have received formula information or toxicity data [65].

For recall

In order to provide complete product traceability throughout the supply chain in the event that a recall is necessary, a list of all customers should be kept that includes contact details [72].

Specific requirements

BIS Specifications for Shampoo (Soap-Based)

General requirements

BIS Specifications for Soap-based shampoo are as follow:

- Shampoo should not contain any trace of carcinogenic ingredients
- Environment clearance consent is mandatory for a shampoo manufacturer

- Shampoo should be dermatologically safe.
- The presence of biodegradable agents in the product should adhere to the limit prescribed under the ECO mark.

Packaging Requirements
- The product package must indicate all the Ingredients and their corresponding quantity.
- Presence of ECO Mark should be there.
- The product's material should adhere to the norms under labelling as per environmentally friendly packaging.

Ingredients
The raw material utilized in shampoo making should adhere to the requirements of Indian standards.
If dyes are present in the product, they must fulfil the underlying provisions.

Sampling
- Testing of the product should be performed as per IS 3958: 1984
- Tests shall be conducted as per the composite sample.

If a sample cleared these tests, it shall be deemed that all the conformed requisites have been fulfilled.

Packaging and Marking
- A soap-based shampoo should be stored in glass or plastic made containers or as per the agreement drawn between the purchaser and supplier.
- The package must reflect the manufacturer's name, the net volume of shampoo, production source, manufacturing code, and batch number [73].

Colours in dyes
Status of Colours in the Legislation of India
Cosmetics cannot be made with coal tar colours other than those listed in Schedule 'Q' of these Rules due to the prohibition in the Drugs and Cosmetics Act, 1940 and Rules 1945. There cannot be more than in the coal tar colours used to make the cosmetic.
1. Arsenic trioxide concentration of 0.2 parts per million.
2. Lead is defined as 20 parts per million.
3. 100 parts per million of all other heavy metals, measured as the sum of the individual metals.

Table 5: Colors used in Hair products [44]

Product	Recommended	Shade	Color additives	Solubility
Shampoos.	Use level 0.05-0.30% And 0.01-0.05%	Blue Yellow Blue apink	Patent Blue Brilliant Blue Fast Yellow Tartrazine Quinolone Yellow Acid red 80 Acid red 52	Water soluble

As per the Prevention of Food Adulteration Act, 1954 and Rules 1958, some application areas. They are of the permitted natural food colours include, beta-apo-S-carotenal, its methyl and ethyl esters, canthaxanthin, chlorophyll, riboflavin, caramel, annatto, saffron, curcumin. The colours should be pure and should not exceed area 2 0.2 gm/kg of the final product [44].

Hair oils
This standard lays forth the specifications for hair oils and other oil-based hair cosmetic preparations.

Table 6: Hair Oil Specifications [74]

IS No.	Title
543: 1975	Cottonseed oil (second revision)
1070 1992	Reagent grade water third
3491. 1963	Safflower oil
3958 1984	Methods of samping (first revision 1
4276 1977	Soyabean oil (first revision)
4707(part 1)	Classification for cosmetic raw materials and adjuncts: Part 1 Dyes, pigments and colours (first revision)
4707 part 2	Classification for cosmetic raw materials and adjuncts. Part List of raw materials generally not recognized as safe for use in a) Castor oil conforming to IS 11486: 1985, cosmetics (first revision)
7299 1974	Mineral oil for Cosmelles industry (first revision)
11375:1974	Mineral oil for cosmetics industry (first revision)

Hair creams
The Bureau of Indian Standards requirements must be followed by hair creams and other oil-based emulsion preparations for the hair, including w/o and o/w emulsions. IS:7679-1978.
1 Oils, brilliantines, and pomades for hair are not covered by this standard.

Types
There will be four different types of hair creams, including:
a) Type I is based on vegetable oil emulsion,
b) Type 2 is based on mineral oil emulsion,
c) Type 3-is based on vegetable-mineral oil emulsion, and
d) Type 4 is based on any combination of the above with fatty acids/fatty acid esters emulsion.

In Appendix B, several common hair cream formulas are provided for information.

Requirements
Description: The hair cream must be a thick emulsion or unctuous mass in consistency. It must be either white or a solid colour with or without perfume.

Ingredients: Unless otherwise stated, all raw ingredients used in the manufacturing of hair creams must meet the specifications stated in the applicable Indian Standards, if any. Colours used in the production of hair creams must comply with IS: 4707 (Part 1)-1968 criteria, according to the Drugs and Cosmetics Act and Rules published by the Government of India.

Ingredients other than colours must adhere to IS: 4707 (Part II)-1973's requirements.

Appendix C contains a list of ingredients often used in the manufacturing of hair creams.

Table 7: Requirements for Hair Creams [75]

S. no.	Characteristics	Requirements	Method of test (Ref. to Cr. No. in Appendix D
1	Thermal stability	To pass the test	D-1
2	pH	5.0 to 9.0	D-2
3	% by mass of the total fatty ingredient content, minimum	15	D-3
4	Water content, percent by mass, Max	85	D-4
5	Test for rancidity	Shall be free from rancidity	D-5

Packaging and marking of product

The cream needs to be put into the right, well-sealed containers.

Legibly marked on the containers must be the following information:

a) Name of the substance,
b) b)manufacturer's name, and/or a recognized trademark, if applicable,
c) Net mass of the material, and
d) Batch number, either in code or another format, allowing the lot of manufacture to be tracked back in records.

The Standard Mark may also be placed on the product.

The requirements of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations adopted thereunder regulate the usage of the Standard Mark [75].

Hair spray

PACKAGING:- Spray pumps and aerosol cans are both suitable for packaging hairspray.

Traditional aerosols contained just one chamber where the product and propellant were in close contact to one another.

Modified aerosol containers, such as Piston packs, Sepro cans, European Bag-in-can systems, Tri-aerosols, Co-dispensing valve aerosol cans, venturi-spraying, Aquasol, etc., were created as a result of compatibility problems during storage and dispensing.

For years, hair lacquers have been dispersed via the plastic squeeze bottle.

Hair waving preparations

Modern permanent wave solutions employ a reducing agent solution as an initial step to break the disulfide bonds in the hair. The chemical bonds are then restored by an oxidation process during neutralisation. The speed at which the solution diffuses into the hair shaft during the perming procedure acts as a rate limiting factor and regulates the rate at which the perming response occurs.

A company should have all the answers to the following queries before releasing a permanent-wave product on the market:

- The product waves the hair, but how strongly?
- What degree of hair damage does it cause?
- Can better style and maintenance be produced by the permanent wave? [44].

Conclusion

The work presented in this paper shows that the field of hair cosmetics is one that is still expanding and is quite exciting. The hair industry is constantly devoting resources to the development of new substances, compounds, and techniques for treating hair. However, in daily life, everyone takes care of their hair's health and appearance. Patients with hair diseases are typically the major actors targeted by these products.

Whether one has a scalp or hair problem, shampoos is an essential component of everyone's hair care regimen. The purpose of this page is to inform dermatologists about the fundamental actions and results of hair washing, shampoos and conditioners, bleaching agent, colouring agent, and hair styling on the hair and scalp. It may be inferred from the aforementioned studies that hair conditioners have great conditioning qualities.

These days, people are more likely to colour their hair.

GMP is a critical aspect of the cosmeceutical industry, ensuring that cosmetic products products are safe, effective, and of high quality. By following GMP guidelines, companies can comply with regulatory requirements, maintain public trust, improve efficiency, and continuously improve their manufacturing processes.

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