

CHANGING SCENARIO OF COSMETIC PRODUCTS FOR SKIN AND HAIR

Abstract

Pollution is the adverse alteration of the physical, chemical, and/or biological characteristics of air, water, or soil brought on by the presence of an excessive amount of different contaminants known as pollutants. Pollutants are dangerous substances that can be either foreign chemicals, energies, or contaminants that occur naturally. Both substances and energies can be considered forms of pollution.

Air pollutants are separated into primary and secondary categories depending on whether they are directly released from the source or are formed by the reaction of primary pollutants with other species. They can be generated as the result of various human activities or natural events, and the same is true for water pollution. Many of the anthropogenic activities like transportation, and the various vehicles - autos and buses- by-products released are carbon monoxide, oxides of nitrogen, and particulate matter that can pollute the air. Natural processes can also release their specific contaminant like volcanic eruption (SO₂, CO, Fine PM), biogenic emissions (VOCs, terpenes, isoprenes, pollen) and cause air as well as other types of pollution.

The second classification is based on the physical characteristics of the pollutant; the first in this are gases such as carbon monoxide, ozone, nitrogen oxides, and sulphur; the second includes particulate matter (PM), such as carbon black, and heavier hydrocarbons which are in form of aerosols, suspensions of liquid and solid particles in the atmosphere. Numerous antigens with a proteinaceous nature that are mostly airborne and known as aero-allergens are also pollutants that might result in allergic responses. They can be produced by household dust, pets, medications, food, pollens, fungi, and mite products. Additionally, these goods contain the antigens absorbed and transported by organic or inorganic dust particles.

The concentration of pollutants in the natural environment is increasing at alarming rates, which is

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not good for both human and animal health. Both internal and external bodily parts may be impacted by them. This could eventually lead to the slow deterioration of these organs. Proper maintenance on a regular basis must be carried out in order to maintain the proper health of the body's external parts. The pollutants may get deposit filth on the skin, and some chemicals may even reach the deeper layers of the skin. Human skin's protective barriers may be reduced as a result of their presence. This can also result in issues of the skin like pigmentation, tone patches, dullness, and wrinkle development, leading to premature aging of the skin. The water contains some extra pollutants also namely pathogens, poisonous minerals, and dead and decomposing things present in greater amounts and can therefore have a more impact if they come into touch with skin. The penetration of air pollutants through the epidermis and pores is more prominent due to the majority of these components being in liquid form.

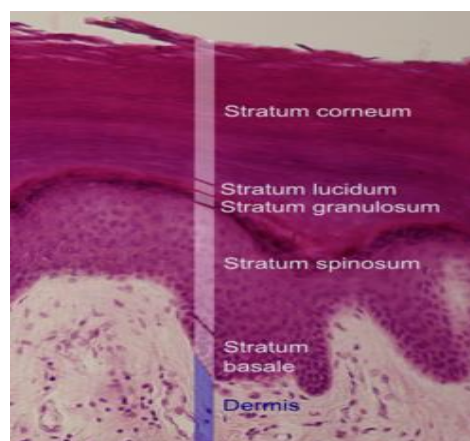
Various cosmetic preparations can be used for this purpose. According to EU Regulation 1223/2009, "Cosmetic product means any substance or mixture intended to be placed in contact with the external parts of the human body (epidermis, hair system, nail, lips, and external genital organs) or with the teeth and the mucous membranes of the oral cavity with the view exclusively or mainly to cleaning them, perfuming them, changing their appearance, protecting them, keeping them in good condition or correcting body odours". Cosmetic products are classified as leave-on or wash-off products. The products containing natural ingredients available now are superior to fully synthetic products. Thus, switching from chemicals to natural products that contain some inert components can be can help effectively achieve the goal.

Several patents have also been granted for cosmetic products of natural origin. The main strategy should be to deep clean, provide complete protection, protect against attacks and restore proper function. A better understanding of pollutants and their mechanisms of action on the body has led to the development of better products.

I. STRUCTURE OF SKIN

The skin consists of two main layers - epidermis and the dermis. The subcutaneous layer is known as the third layer of skin. The layers are arranged as epidermis, dermis, and subcutaneous or hypodermis layer from outside to inside. The epidermis is the surface layer that comes mostly in contact with the environment and is the first layer affected by any environmental change. It has ridged and patterned surface as visible on the fingertips. The cells are complex and multi-layered. There is no blood supply, nerves supply, or sweat glands in this layer. This layer serves the function of a physical barrier for protection against the environment (harmful radiations, temperature fluctuations, different microbes, mechanical disruption, and chemicals). This layer is a waterproof barrier. The layer also tolerates desiccation thus keeping us safe during exposure to nonaqueous environment. It is vital for the thermal control of our body. This layer plays a key role in protection from external invasion. The acid covering which is an very fine and a little acidic coat (pH 4.5-6.5) present on the surface of the skin it is a barrier to invasion by microorganisms, or other substances that might enter through the skin. The contaminants and other chemicals (like soap, and cleansers) are alkaline in nature and thus the acidity present on the skin helps to neutralize these chemical effects.

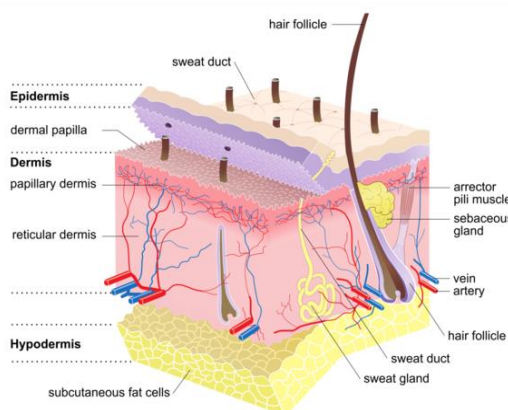
This layer is constantly renewed, the main cell keratinocytes within the epidermis are formed, followed by their maturation, and then they die. They completely renew themselves every 45 - 75 days. The thickest epidermis is present on the palms and soles of the feet. The stratum corneum is the layer of the epidermis that plays the key role in topical treatment of various disorders of the skin and improving appearance. The three main living cell types existing in this layer are - keratinocytes, Langerhans cells, and melanocytes. Each cell has a specific role like keratinocytes contains substantial portions of the keratin protein, which is a tough, insoluble protein providing physical protection, rigidity, and strength to the cells. The Langerhans cells also known as the dendritic cells are performing the immune function in the epidermal layer. Melanocytes provide skin colour. They perform an important barrier function and synthesize melanin, which absorbs UV light and provide ample protection against UV radiation. The basal keratinocytes have cytoplasmic rootlets also known as serrations (connects like interlocking fingers) that continue into the next layer which is the dermal papillary layer.



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Figure 1: The figure showing the five layers of epidermis – outer most, Stratum corneum, stratum lucidum, stratum granulosum, stratum spinosum and stratum basale inner most.

Figure 2: The figure showing the different layers of skin and the major components of the dermal layer.



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Mast cells are present at the junction of epidermal and dermal layers, near the capillaries. They produce mucopolysaccharides, release histamine through lysosomes, and activate the repair function of the skin. The next thick and fibrous layer is the dermis. This is the layer that gives shape to the membrane and helps to cover the organs under it and protect them from mechanical or any other damage. The top layer of the dermis is the papillary layer which is thinner than the reticular dermis the second layer. The ground substance (extracellular matrix) present is the material found around the cellular and fibrous components present. It contains aqueous gelled polysaccharides or mucopolysaccharides and has collagen fibres (strength) and glycoprotein, water, inorganic salts, and hormones. Collagen fibres, fibroblast cells (which generate fibrous material), fat cells, blood vessels, nerve fibres, touch receptors (Meissner corpuscles), and phagocytic cells are among the cellular and fibrous components. Blood vessels and connective tissue support the skin in the dermis's second reticular layer. Collagen, elastin, and proteoglycans are connective tissue proteins with distinct functions. The rigid scaffold that covers the body is collagen. Types I, II, and III are the three main types of collagen fibres. These molecules combine to form the fibrous network of fibroblast cells. They are the connective tissues mostly found in animals and synthesise ECM (extracellular matrix) and also collagen. They play an important role in the healing of wounds. Elastin is also a protein

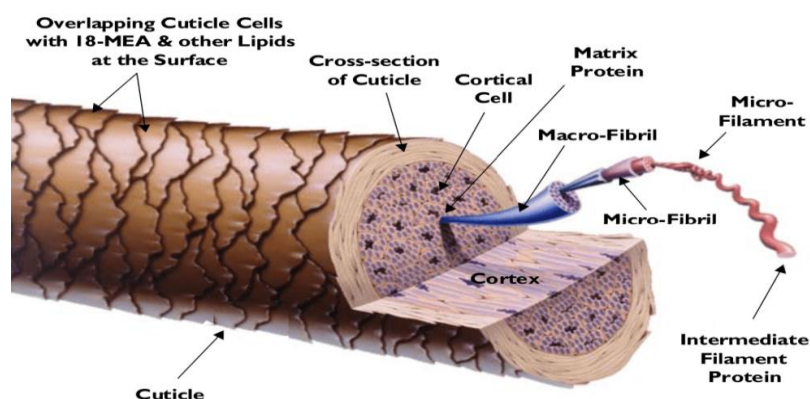
that provides elasticity and strength. They cannot be classified further. They are linear elastic materials that deform. The reticular dermis also contains hair follicles, the structures oil and sweat glands, and some other structures. Proteoglycans participate in damage repair.

II. STRUCTURE OF HAIR

Hair grows from the dermis and begins in the follicle bulb. Lanugo hair (present at birth but falls out), vellus hair (all over the body), terminal hair (thicker and darker hair on the scalp), and bristle hair (beards) are different types of hair. Some of the special cells in the superficial dermis multiply and protrude to form a peg, beneath which specialized fibroblasts will develop into the dermal papilla. The hair shaft is formed when cells of the epidermis, which are adjacent to the dermal papilla start multiplying and force a layer of keratinizing cells upwards to the scalp's surface. As the column lengthens, the hair peg is pushed down to form the follicle, the bulb-like structure. The arrector pili muscle to support hair and sebaceous glands are found in this portion. The highest rate of cell division is in the hair follicle in the human body and thus requires energy for proper growth.

The outermost structure is the cuticle, which surrounds the cortex. Flat cells in the cuticle overlap in a roof-tile pattern and are held together by an intercellular cement. The outer membrane of each cell is composed of three layers: A-layer, the exocuticle, and the endocuticle. The cortex, which is made of elongated keratinised cells attached together with intercellular material, accounts for the majority of the fibre mass. The cortex is divided into two regions: the para-cortex (the dominant component) and the ortho-cortex (the minor component). The ortho-cortex cells are not protected by a sulphur-rich matrix with chemical cross-links, unlike the paracortex cells.

Cortical cells contain macrofibrils. Pigment granules and nuclear remnants cause the length variation. The macrofibril of width 0.1 μm to 0.4 μm , contains microfibril with a width of approximately 0.007 μm . A protofilament, a substructure with an estimated width of 0.002 μm , has been discovered within the microfibril. The basic and fundamental structure of the hair is thought to be three α -helix polypeptide chains.



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Figure 3: Structure of hair fibre with different layers and sub-structures.

Hair fibres, like skin, are composed of complex protein keratin (85%), which is formed in the body through the condensation of eighteen different types of amino acids. Lipids (3%), pigment (2%), and associated water (7%) are the other major components. Melanin, the other component, is made from the amino acid (non-essential) tyrosine. Some metals present in trace amounts include calcium, magnesium, aluminium, chromium, iron, copper, manganese, and zinc. Phosphorus compounds, which are primarily derived from degraded cortex cell nuclei, are also present in abundance.

Hair grows in a cyclical pattern. This cyclic activity is carried out by all follicles. The active growth or anagen phase, during which hair is produced, is followed by the telogen phase, a period of rest. In the latter period, the fully formed or club hair remains fixed in the follicle by its expanded base, and the dermal papilla is free of the epidermal matrix. The latter is now only a minor secondary growth. The catagen stage occurs between the anagen and telogen stages, and it is characterised by the movement of newly formed club hair towards the skin's surface. Approximately 85% of scalp hair is said to be in the anagen phase at any given time, with the remaining 12% and 3% in the telogen and catagen phases, respectively. These proportions were found in a study of the mechanical properties of scalp hairs from a single head. Anagen phase of the hair can last up to three years.

Keratin in hair can chemically react with alkali and acid, causing hydrolysis. Individual amino acids and peptides are released as a result of alkali hydrolysis. The protein is completely degraded by acid hydrolysis into its fundamental amino acids. As a result, after completion, almost no material containing the peptide unit remains. Cysteine, a sulphur amino acid, can be reduced to general thiol groups (—SH) by reducing agents.

III. INTRODUCTION TO POLLUTION

According to the WHO "Pollution is the introduction of contaminants or harmful materials into the natural environment that causes adverse changes". Pollution is also defined as an unfavourable change in the physical, chemical, and/or biological properties of air, water, or soil caused by an excess of pollutants. Pollutants, the harmful materials that can be either foreign substances, energies or naturally occurring contaminants. Pollution can take the form of any substance or energy.

- 1. Air Pollution:** The Environmental Protection Agency (EPA) divides air pollutants into two broad categories based on the source of the pollutants. The first class of pollutants is those that are emitted directly from sources with no chemical or physical change. As an example, consider the carbon monoxide emitted by automobile exhaust. These types of gases are called non-reactive as they generally do not react with other gases, and are also not altered by solar radiations. The second class is of secondary pollutants, formed in the atmosphere because of chemical reactions between primary pollutants and other species, like UV radiations, and are released in the atmosphere. An example is a reaction of VOCs (Volatile Organic Compounds) with the oxides of nitrogen in presence of UV radiation leads to the formation of ozone, which is ground-level ozone and is harmful to sensitive vegetation and ecosystem.

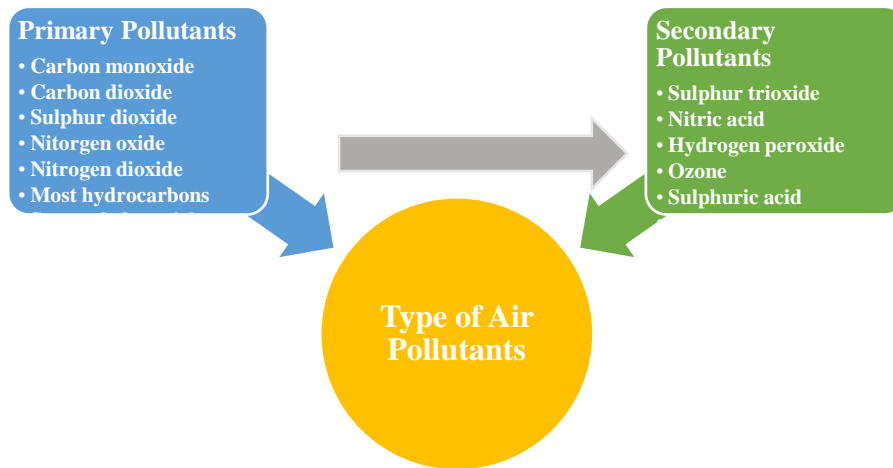


Figure 4: The classification of the air pollutants a) Primary Pollutants b) Secondary Pollutants and their relationship.

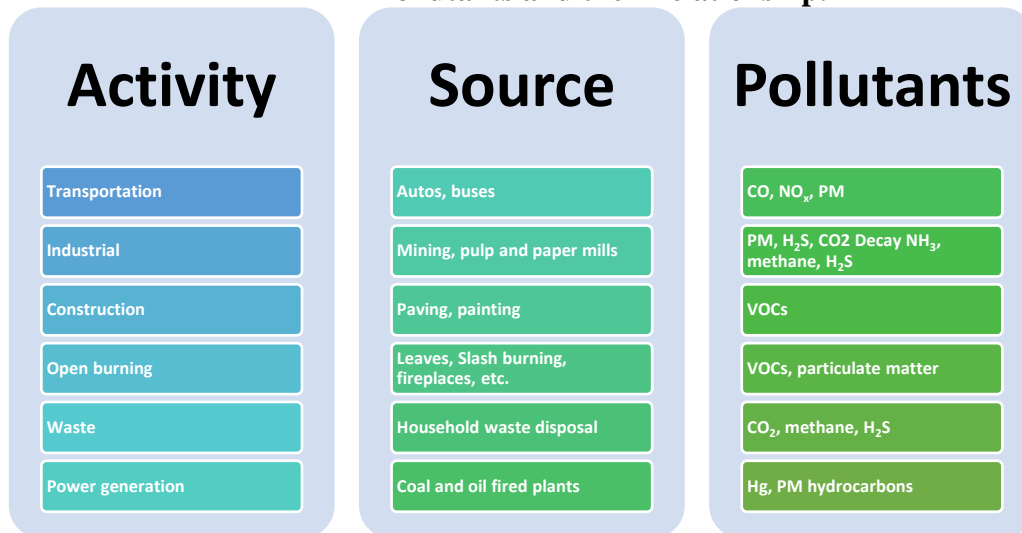


Figure 5: Anthropogenic activities, causing air pollution, their sources, and the pollutants from the activity.

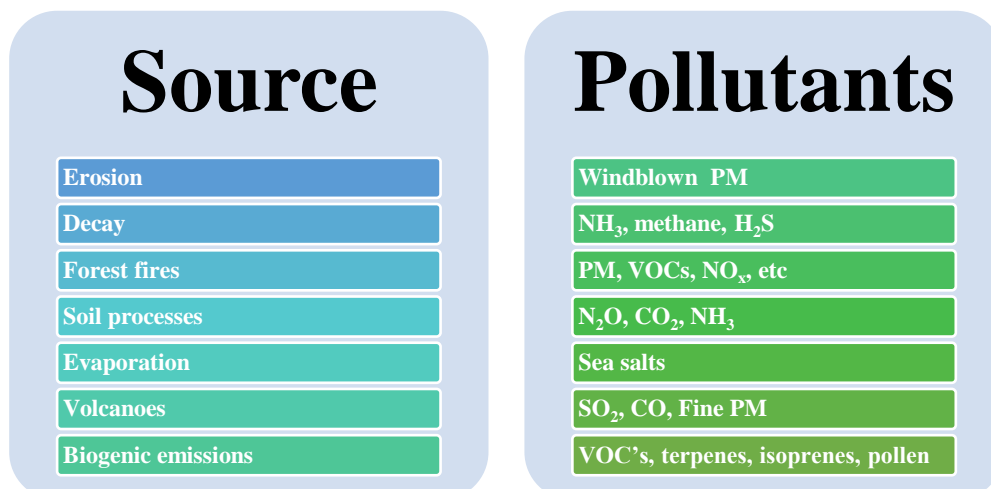


Figure 6: Natural sources, causing air pollution with their respective pollutant

The other classification is based on the physical properties of the pollutant the first can be gas like carbon monoxide, ozone, oxides of nitrogen, and sulphur; the second can be particulate matter (PM), like carbon black, and heavier hydrocarbons. They are aerosols, which have both solid as well as liquid particles suspended in the air.

Another class of components known as aero-allergens are various antigens that are mostly airborne, having proteinaceous nature, which can cause allergic reactions. They can be generated from house dust, animals, drugs, food, pollens, drugs, fungal spores, and mite products. These products also include the antigens adsorbed and carried by inorganic or organic dust particles. Pollutants in the air can alter allergenic proteins' thus leading to variation in the interactions with the immune system. When several types of pollens are exposed to NO₂, their allergenicity is modified.

- 2. The Water Pollution:** Treated freshwater ecosystem which is most likely to come in contact with the human skin, when used for various day to day activities. This water contains chlorine used for treating water to make it fit for drinking, but this chlorine can damage the skin and hairs. Water can be polluted from both natural and human activities which can add pollutants to the water used for various purpose.

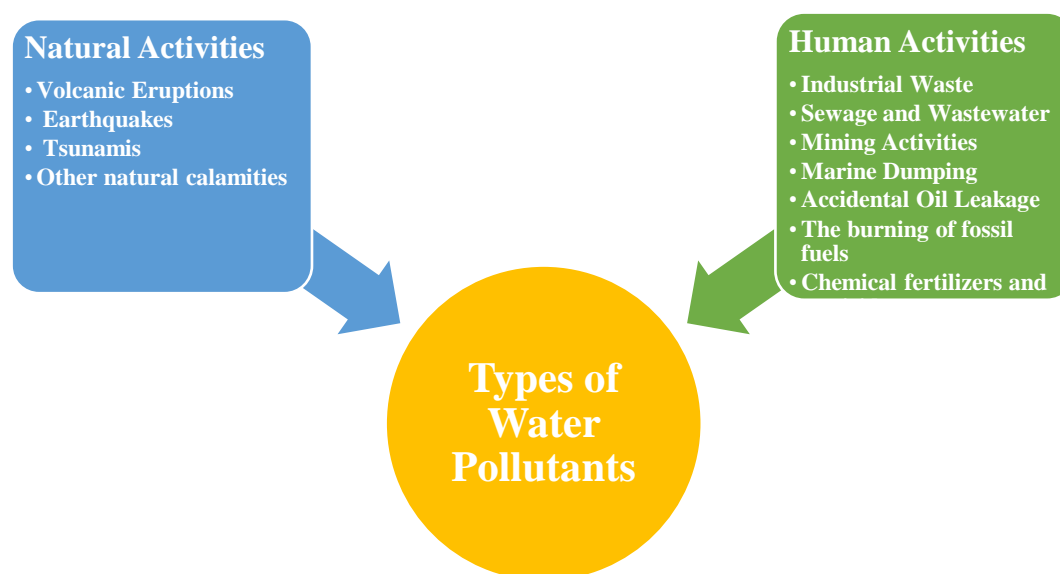


Figure 7: Natural activities and human activities causing water pollution with their source.

When the fossil fuels (coal, oil) are burned for various purpose, they emit a substantial amount of ash into the atmosphere. The toxic component from the ash when combine with the water vapours present in the atmosphere may lead to acid rain. In many places the garbage collected from household garbage like glass, rubber, aluminium, paper, and food are collected and then are dumped into the sea. Some of these objects may require only 2 weeks to decompose but many may require many years which can even extend to two hundred years. Many dangerous chemicals like sulphur, asbestos, mercury, lead, nitrates, and others may be present in them. These toxic substances can even lead to the change in the colour of the water, to increase the amount of minerals present in the water (eutrophication), can cause change in the temperature of the water, which can present a serious threat to aquatic organisms thus leading to more pollution from excessive loss of aquatic life. The sewage and wastewater generated from households and other setups are treated and then released into the sea along

with fresh water. The main pollutant from them can be pathogens, and/or chemicals that can lead to major health issues and may be diseases.

Wind, floods, storms, and other activities like littering, can cause garbage to enter various water sources. Mining activities can also produce from rocks a large quantity of metal and sulphides wastes, which can be harmful to the environment. An exceedingly small leak in the sewer lines can also contaminate the underground water, rendering it unfit for human consumption. The contaminants can combine with rivers and canals through rain as they are washed from air and various surfaces and added to water sources.

Another important consideration is that if water becomes contaminated, it is a time-consuming and costly process to restore its usability by removing pollutants. According to a data, approximately 80 per cent of wastewater generated throughout the world is untreated.

IV. THE EFFECT OF THE POLLUTANTS

1. Air and water pollutants' effect on skin: The pollutants cause dirt on the skin as they settle there, and some chemicals may even penetrate through skin layers to cause some of the effects discussed in detail later. This can lead to weakened barriers of human skin and start inflammation. This weakened barrier can also lead to poor hydration of the skin. Biomarkers' presence in lower concentrations as a result of these components is also indicative of a weakened skin barrier. This can further lead to problems like the pigmentation of the skin, patches in tones of the skin, its dullness, and wrinkle formation, which may lead to premature skin aging.

Water pollutants, many of which come from the atmosphere, have similar compositions; however, the other components, pathogens, toxic minerals, and dead and decaying matter, are all in greater quantities and thus can cause a greater effect if they come into contact with the skin. Further, these components are mostly in liquid form so the penetration through the epidermis and pores is more pronounced as compared to air pollutants.

Many air pollutants, such as ultraviolet radiation, aromatic hydrocarbons (polycyclic), VOCs, nitrogen and sulphur oxides, particulate matter, ground level ozone, and cigarette smoke, have an adverse effect on the skin when they come into contact with it. These agents can cause oxidative stress, which can lead to skin damage. Human skin has many mechanisms to protect against oxidative or physical air pollutants, but prolonged or continuous exposure to higher levels can have a number of negative effects on the exposed human skin. High-energy ultraviolet radiation exposure is also linked to skin ageing and several types of skin cancer. Particulate matter (PM), a component of air pollution, has been scientifically proven to cause severe damage to humans when skin is exposed to it. It causes skin aging and affects dermal fibroblasts. The studies available have mostly worked on PM₁₀. When dermal fibroblasts are exposed to PM₁₀, the increased expression of inflammatory cytokines and fibroblast chemical mediators takes place. Thus, PM₁₀ exposure cause skin inflammation as well as skin aging through impaired collagen synthesis mechanism.

The other components of cigarette smoke also play role in premature aging as well as increase, the occurrence of problems like acne, skin cancer, allergic skin, and psoriasis. Polyaromatic hydrocarbons have also been linked to skin ageing, pigmentation, cancer, and acneiform eruptions. VOCs (volatile organic compounds) have been linked to Atopic Dermatitis. The continuous sun damage causes the effect on the secretion of ground substance in sufficient quantity by fibroblasts leading to reduced repair on time and making skin lax, wrinkled, and poor healing of the skin leading to signs of the process of aging. Upper dermal collagen patterns are disrupted and tangled, with altered staining properties. The entire skin is thinned, including the epidermis, and many fibroblasts are lost. Old skin heals slowly because the dermis can no longer regenerate.

Although, the healthy body generates Reactive Oxygen Species (ROS) daily as a normal body process. When the bacteria or other foreign body, attacks the body, its defensive immunity system produces free radicals to create a hostile environment in which they can be controlled. These ROSs are also produced whenever the body is facing environmental insults in the form of UV radiation, smog, suspended drug particles, alcohol, and cigarette smoke. They disrupt and damage the lipids as well as the proteins present in the skin and thus reducing the body's natural antioxidants control mechanism and free radical control mechanism which are in place. Antioxidants are there to neutralize the effect of the free radicals and thus reduce their damaging effects. The photo-aging leading to changes in ECM is also the result of ROS causing changes in collagen and elastin. Thus, leading to the degeneration of collagen. They can also lead to the increase in the sebum production of the skin.

Lastly, the pollutants in the atmosphere can exist as solids, liquids, gases, or particulate matter. These are absorbed into the subcutaneous tissue directly through the skin, hair follicles, and sweats as well as sebaceous glands. Pollutants in the air cause oxidative stress, which weakens the skin's antioxidant defences. The antioxidant capacity of non-enzymatic antioxidants like glutathione, Vitamin E, Vitamin C, and enzymatic antioxidants (glutathione peroxidase, superoxide dismutase) antioxidants is depleted. Through oxidative damage, air pollutants cause severe changes in the normal functions of lipids, DNA, and proteins in the human skin, resulting in extrinsic skin ageing, inflammatory or allergic conditions like contact dermatitis, atopic dermatitis, psoriasis, acne, and skin cancer.

Similarly, water pollutants can also lead to acne and premature ageing, among other skin issues. They also has the potential to cause collagen damage, which can lead to hyperpigmentation and fine lines as well as also aggravate acne and rosacea by causing inflammation.

- 2. Air and water pollutants' effect on hair:** Day in and day out, everywhere we are encountering the environmental conditions that are very much threatening for the hair and scalp health. Air pollutants as discussed above includes from both natural and anthropogenic activities which can be harmful to the health and well-being of our scalp. The scalp can be subjected to the same stressors as the skin. Pollution causes sensitivity issues and may also cause discomfort which can be due dryness or excess oil secretion on the scalp. When sebum is produced in excess on the scalp, it results in oily and greasy hair

as well as roots which can block pores and thus hair follicles, leading to weak hair root and hair breakage or its loss.

When hair fibre is exposed to pollutants, such as gases, PM, or dust particles they penetrate the superficial cuticle layer and thus producing the hair fibre that is dry and brittle. The constant exposure to environmental elements and external aggressors, causes the damage to the structure of the hair strands.

PM can bind to the hair surface and infiltrate the hair follicles despite being forty times smaller than the hair fibre. When these particulates fall on hair or scalp cells, they produce free radicals and oxidative stress, which causes severe cell damage. As a result, there is ageing process like that seen with chronic UV light exposure.

Pollution, according to some studies, affects the status of skin and scalp cells, which in turn changes superficial biochemical parameters like sebum secretion, lipid peroxidation or protein carbonylation, antioxidant levels, barrier function, and ageing processes like DNA mutations.

V. COSMETICS, THEIR ROLE IN CONTROLLING THE EFFECT OF POLLUTION

According to EU Regulation 1223/2009, “Cosmetic product means any substance or mixture intended to be placed in contact with the external parts of the human body (epidermis, hair system, nail, lips and external genital organs) or with the teeth and the mucous membranes of the oral cavity with the view exclusively or mainly to cleaning them, perfuming them, changing their appearance, protecting them, keeping them in good condition or correcting body odours”. Cosmetics are classified as either leave-on or rinse-off. A product that is designed to remain on the skin for an extended period of time in order to perform its functions is known as a leave-on cosmetic. For example, perfumes, face, and lips decorative cosmetics, body creams, face creams, and antiperspirants. Shampoos, soaps, shower gels, and toothpaste are examples of rinse-off cosmetics, which are intended to be rinsed away after only brief contact with the skin or mucous membranes. The dermal layer is responsible for most of the skin's health and beauty. The natural defence mechanism of the human body macrophages, mobile cells, and leukocytes are they attack invaders in the damaged skin. The booster added for them can also lead to less effect of foreign invaders.

The primary function of our skin is as an immune barrier, and pollutants can weaken this barrier, it is critical that the barrier is restored when ever disturbed. This can be accomplished by supplementing the skin with vitamins E, C, B, as well as antioxidants. They help to heal free-radical-damaged skin and maintain a healthy immune barrier. Citrus fruits, beetroot, oregano, apple, avocado, blueberries, leafy greens, and beans, all aid in the healing of the body, especially the skin.

Depending on the skin type for which the product is designed, the ingredients may be included in cosmetic product. Oligopeptides, antioxidants, hyaluronic acid, vitamin B5, plant butters, aromatic oils, cucumber, and cilantro can be used to treat dry skin. Similarly, pure hyaluronic acid, natural components containing activated charcoal, kaolin clay, glycolic acid, and vitamin C can be used on normal skin. Oily skin can be treated with niacinamide, activated charcoal, salicylic acid, mandelic acid, vitamin C, and calendula. Acne-prone skin is benefited

from tea tree, menthol, sulphur retinol, vitamin C, and cinnamon bark extract. For ageing skin, retinol, vitamin C, vitamin E, ferulic acid, peptides, and ginger leaf can be used.

The past twenty years of data and published research support niacinamide's ability to restore and strengthen the protective barrier of the skin, while also improving skin hydration and promoting skin surface exfoliation. Anti-aging products are to restore the regenerative/degenerative balance with the increase in collagen and elastin fibre synthesis. They also maintain the delicate balance between antioxidants and the body's Reactive Oxygen Species (ROS). Examples of topically applied substances that have the potential to help with balance include Retinol Alpha hydroxy acids (AHAs) vitamin A derivatives, and vitamin C they help the proper functioning of fibroblast, increase fibres' water-retaining capacity and increase skin suppleness and firmness.

The newer *ex vivo* research data show that pea (*Pisum sativum*) and chia (*Salvia hispanicum*) seed extract with the trademark name “Procataline™ G2 biofunctional” can reduce hair and scalp damage caused by air pollution. These studies conducted on scalp cells have shown that the isolated hair follicles or 3D dermal papilla cells, improve the scalp's antioxidant defence mechanism, hair follicle nutrition, and regeneration potential after exposure to major air pollutants. This improves scalp hydration and barrier function while also reducing sensitivity, redness, and desquamation. According to the company's data, “Procataline™ G2 biofunctional” chelates major heavy metals and reduces tryptophan degradation in hair fibre keratin, making the hair less susceptible to damage.

The conclusion from the above discussion is that the strategy involved should deep cleanse, give full protection, defend the invasion, and restore proper functioning. A better understanding of the pollutants and mechanisms of their effect on the body has led to developing better products. Switching from chemicals to natural products with some inert parts can help achieve the aim effectively. The regimen to counter the effect of pollutants can be divided as follows-

1. The proper cleansing of hair or skin. For that making, products lead to surface and deep pore cleansing and do not affect other functions of the part. They should also purify, rejuvenates, and give a fresh feel.
2. The protection from ultra-violet radiation (UVA/UVB). The SPF containing the products of natural origin. The product should also retain moisture.
3. The use of antioxidants to fight free radicals and restore balance.

VI. COMMON DOSAGE FORMS OF COSMETICS

According to a Future Market Insights (FMI) report named Anti-Pollution Ingredients Market Outlook (2022-2031) a 300 page document issued on July, 2022, the global sales of anti-pollution ingredients market which is now at US \$870.4 million is expected to grow at a healthy rate of 5.4% by 2031.

The Natural and Non-prescription Health Products Directorate (NNHPD) has identified many dosage forms which are commonly prepared as cosmetic product. Some of the dosage forms which can be helpful to combat the effect of pollution are given below in the table 1. The product description is also given to explain their use in reducing the effect.

Table 1: The Products Preferred for Counteracting Effect of Pollutants.

Name	Description
Astringent	The product that firms and tones the skin are commonly referred to as "toners". They are mostly applied after washing to condition skin so that other products like moisturisers can be applied.
Cleanser	Cleansers are topical liquid facial care products designed to remove make-up, dead skin cells, oil, and dirt from the skin of the face. Lotions are commonly used dosage form.
Conditioner	Emollient-containing preparations can be applied to the hair or skin to improve the feel, texture and appearance. Cream, gel, and topical liquid are the most common physical dosage forms.
Exfoliant	A product applied to the skin to remove dead skin cells. Cream, gel, and topical liquid are the most common physical dosage forms.
Lip balm	An product is applied to form an occlusive layer on the lip surface to seal moisture in the lips and protect them from external environment. Physical dosage forms commonly associated are paste and sticks.
Masks	The product that is intended to dry or solidify on the face or it remains wet for a set period before being removed. Frequently associated physical dosage forms: powders, pastes.
Moisturizer	A skin-hydrating and anti-drying preparation. The commonly associated physical dosage forms are cream and lotion.
Mousse	Preparation with a foaming (light and airy) texture designed to improve product dispersibility and spreadability. Available in both pressurised and non-pressurized containers.
Serum	A highly concentrated skin, nail, or hair products. Physical dosage forms commonly associated are concentrate, gel, and topical liquid.
Treatments	Preparation intended for a specific area's surface treatment (or aesthetic condition). This preparation must be used with a qualifier, such as hair treatment, nail treatment, or skin treatment. Cream, paste, and topical liquid are the most common physical dosage forms.
Night Cream	A night cream is any product that is applied to the skin before going to bed and is left on while sleeping.
Shampoos	A product for cleansing hairs and may contain a medicinal and/or a nutrient component.

VII. NATURAL INGREDIENTS FOR HEALTHY SKIN AND HAIR

Many of us adhere to a strict beauty product regimen in order to maintain the health of our skin and hair. When it comes to beauty, natural ingredients containing products should be prioritised over others. The chemicals and ingredients used in many of the products may produce toxin in due course or toxic themselves. This can cause significant harm in the long run. Most of the agents given in table 2 counter the effect of one or more of the pollutants and keep the skin, hair, and scalp healthy. Along with the external application of products, a healthy diet when taken in the correct proportion and proper intake of water is also recommended.

Many fruits and vegetables (e.g., Carrots, Sweet Potato, Apricots, Squash, Apple) containing antioxidants and full of vitamins and minerals can also be helpful.

Other ingredients that can help keep skin nourished and moisturized from the inside include Some grains like millet, a rich source of the mineral salt and silicon, which helps in the removal of toxins and quinoa contains proteins in high amounts and also some essential minerals that can help to nourish the skin and retain its moisture. Some of the oily fish containing essential fatty acids and the oil/seeds of flax, pumpkin, almonds, and hemp are also helpful.

Natural moisturising oils can also be used. They include Mango butter, Shea butter, Cocoa butter, Grapeseed oil, Apricot kernel oil, Avocado oil, Hemp seed oil, Jojoba oil, Macadamia nut oil, Castor oil, Olive oil, Rosa mosqueta oil, Emu oil, Evening primrose oil, Wheat germ oil. Many herbal products activity is reported in research articles but their potential in actual products is yet to explore.

Table 2: The List of Some Natural Ingredients used to get Healthy Skin and Hair, their Active Constituents and Effects.

Ingredient/ Botanical Source	Constituents present	Effect on Skin	Effect on Hair
Coconut oil can be obtained from matured kernels of coconuts <i>Cocos nucifera</i> Family-Arecaceae.	Rich in medium-chain triglycerides <ul style="list-style-type: none"> • Capric acid • Lauric acid • Tocopherols • ketones • lactones • δ-lactones 	<ul style="list-style-type: none"> • Moisturizing property helps retain moisture in the skin, to give soft and smooth skin. • Protects skin from sun damage. • Reduce inflammation. • Revitalizing the skin. 	<ul style="list-style-type: none"> • Easily penetrates deep into hair shafts. • Helps in hair growth.
Green tea is obtained when the plant of <i>Camellia sinensis</i> Family - Theaceae is processed using different techniques.	<ul style="list-style-type: none"> • Polyphenols namely epigallocatechin gallate. • Higher antioxidants activity. • Catechins having 5-alpha-reductase inhibiting properties. 	<ul style="list-style-type: none"> • Skin protection against UV damage. • Reduction in premature aging signs of wrinkles, age spots, and saggy skin. 	Catechins blocks dihydrotestosterone (DHT), a key components of hair loss.
Lemon is extract from the fruit, its juice, or even an essential oil from the plant of <i>Citrus limon</i> Family-Rutaceae.	<ul style="list-style-type: none"> • Phenolic compounds- like flavonoids some examples- limocitrin, diosmin, and hesperidin. • Phenolic acids like p-hydroxybenzoic acids, ferulic acid, and synaptic acid. 	<ul style="list-style-type: none"> • Collagen production is enhanced. • Skin's elasticity is restored to enhancing its smoothness and youthfulness. 	<ul style="list-style-type: none"> • Effective in treating dandruff. • Treatment of scalp itchiness. • pH level is maintained on the scalp and thus helps in the prevention of

	<ul style="list-style-type: none"> • Essential oils - mainly belonging to monoterpenoids <ul style="list-style-type: none"> ✓ D-limonene ✓ β-pinene ✓ γ-terpinene 		<p>infections of the scalp.</p> <ul style="list-style-type: none"> • Enhances hair growth.
<p>Honey the saccharine-like substance which is deposited in the cell of honeycomb by <i>Apis mellifera</i> known as hive bee (Order- Hymenoptera, Apidae), and may be other species of <i>Apis</i>.</p>	<ul style="list-style-type: none"> • Fructose • Glucose • Proteins • Amino Acids • Vitamins • Enzymes • Minerals 	<ul style="list-style-type: none"> • Emollient. • Humectants. • Soothing effects which maintain the skin young. • Slows the wrinkle formation process. • Regulates pH level on skin. • Prevent various pathogen infections. 	<p>Mainly conditioning effects on hairs.</p>
<p>Tomatoes berry from the plant <i>Solanum lycopersicum</i>, Family - Solanaceae</p>	<p>The major component is a water-rich antioxidant Lycopene.</p>	<ul style="list-style-type: none"> • Helps protect against sunburn exposure. • Helps to prevent the damage caused to DNA and also play role in its repair. 	<ul style="list-style-type: none"> • Strengthen hair. • Stimulate hair growth by maintaining the pH level of our scalp. • Used in dandruff treatment.
<p>Almonds are the seeds from the <i>Prunus amygdalus</i> Family- Rosaceae, the dulcis, a variety of sweet almonds.</p>	<ul style="list-style-type: none"> • High vitamin E and other vitamins content. • Fatty acids. • Lipids. • Amino acids. • Proteins. • Carbohydrates. • Minerals. • Sugar <ul style="list-style-type: none"> ✓ Sucrose ✓ Raffinose ✓ Glucose ✓ Fructose ✓ Maltose ✓ Inositol 	<ul style="list-style-type: none"> • Good for skin complexion. • Reduce the intensity of sun damage. • Make skin healthy. 	<ul style="list-style-type: none"> • Helps remove damaging free radicals. • Prevent oxidative damage.
<p>Oatmeal obtained from oat from plant <i>Avena sativa</i> Family- Poaceae. Colloidal oatmeal mainly produced using fine powder of oat when is boiling and the colloidal material is extracted.</p>	<ul style="list-style-type: none"> • Main component Phenols <ul style="list-style-type: none"> ✓ Avenanthramides • Colloidal oatmeal • Starch • Proteins • Lipids • Fiber • Beta-glucans 	<ul style="list-style-type: none"> • Cleanser. • Moisturizer. • Buffer. • Soothing agent. • Anti-itch activity. • Anti-inflammatory agent. • Antioxidant properties. 	<p>Dry shampoo can be prepared from a very finely powdered oatmeal.</p>

	<ul style="list-style-type: none"> • Biotin and other Vitamins B 	<ul style="list-style-type: none"> • Anti-histaminic activity. • Restores the cutaneous barrier. 	
<p>Moringa the whole plant of the <i>Moringa oleifera</i> Family- Moringaceae.</p>	<ul style="list-style-type: none"> • Phenols and phenolic acids. • Alkaloids. • Vitamin A. • Vitamin E. • Vitamin C. • Saponins. • Tannins. • Steroids. • Glucosinolates. • Flavonoids and terpenes. • Fatty acids- high content of mono-saturated oleic acid. • Cytokinin. • Crypto-chlorogenic acid. • Isoquercetin as a major active antioxidant. 	<ul style="list-style-type: none"> • Cleanses and purifies the skin. • Prevents and minimizes sunspots. • Moringa oil increases collagen production and thus plays role in reducing fine lines, wrinkles, and sagging skin. • Antioxidant property. • Antibacterial property. • Nourishing properties. • Fatty acids have deep moisturizing properties. • Helps in controlling blackheads, and pimples as well as minimizes dark spots. • Anti-inflammatory properties. • Hyaluronic acid plumps skin and maintains hydration levels. 	<ul style="list-style-type: none"> • Softens shines, and repairs split ends and cuticles. <input type="checkbox"/> Combats dryness, caused by over-exposure to heat. <input type="checkbox"/> Cleansing property while replenishing moisture and maintaining optimal hydration levels.
<p>Harsingar the leaves, flowers and seeds of small tree <i>Nyctanthes arbor-tristis</i>, Family: Oleaceae.</p>	<p>Leave's constituents</p> <ul style="list-style-type: none"> • Oleanolic acid flavanol glycosides. • Benzoic acid. • Methyl salicylate. • Tannic acid. • Fructose. • Glucose. • Carotene. • Amorphous resin. • Ascorbic acid. <p>Flower's constituents</p> <ul style="list-style-type: none"> • Essential oils. 	<p>Plant effects on skin</p> <ul style="list-style-type: none"> • Anti-oxidant property. • Anti-inflammatory activity. • Antibacterial effect. 	<p>Flowers</p> <ul style="list-style-type: none"> • Used as a hair tonic. • To strengthen the hairs. • Prevent hair fall. • Helps to prevent greying of hairs • Many scalp related problems. <p>Seeds</p> <ul style="list-style-type: none"> • In ayurveda used for dandruff.

	<ul style="list-style-type: none"> • Glycosides. <p>Seeds contain</p> <ul style="list-style-type: none"> • Palmitic acids. • Oleic acids. • Myristic acids. 		<ul style="list-style-type: none"> • Help in hair loss. • Alopecia.
<p>Palash flowers and leaves of <i>Butea monosperma</i> Family- Fabaceae.</p>	<ul style="list-style-type: none"> • Rich in sulphur • Fixed oil • Fatty acid <ul style="list-style-type: none"> ✓ Linoleic acid ✓ Oleic acid ✓ Linolenic acid ✓ Palmitic acid ✓ Stearic acid ✓ Arachidic acid ✓ Behinic acid ✓ Linoceric acid. • Alkaloid (monospermine) <ul style="list-style-type: none"> ✓ Palasonin ✓ Palasonin-N-phenyl imide. ✓ Flowers ✓ Butrin ✓ Butein • Flavonoids steroids <ul style="list-style-type: none"> ✓ Coreopsin ✓ Isocoreopsin ✓ Sulphurein ✓ Monospermoside ✓ Isospermoside • Terpenoids • Proteins • Lipids, and sterols <ul style="list-style-type: none"> ✓ Isobutrin ✓ Butrin ✓ Cajanin ✓ Isoformononetin ✓ Stigmasterol ✓ Butein ✓ Medicarpin ✓ Butinas 	<ul style="list-style-type: none"> • For skin problems like acne and pimples. • Astringent effect. • Antifungal. • Antibacterial. • Anti-inflammatory. • Antioxidant activity. • Natural colouring agent. • Having Sun Protecting Factor (SPF) • As given in Ayurvedic text: <ul style="list-style-type: none"> ✓ Naturally Moisturizes Skin-smoothing or emollient effect ✓ Vitamin E - Antioxidant properties. ✓ Leaves as well as flowers extract ✓ Used for sunburns and rashes Soothes aggravated and dried up skin. ✓ Combats Skin Infections ✓ Leaves residue have astringent effect ✓ Used to neutralise the highly inflamed skin. 	<ul style="list-style-type: none"> • Palash nutrients provide nourishment and vigour to the hair. • Leaf or flower paste penetrates deep into the layers of the scalp and protects follicles. • Reduces dandruff and itchy caused by it. • Cures peeling scalp and dry hair. • Treats alopecia. • Prevents hair fall by increasing the blood circulation and nerve function in the scalp.

		<ul style="list-style-type: none"> ✓ Reduces boils, pus or carbuncles on the skin affected by allergies, fungal infections, environmental pollutants and sun rays. 	
<p>Hibiscus flowers and leaves of <i>Hibiscus syriacus</i> Family- Malvaceae.</p>	<ul style="list-style-type: none"> • Beta keratin • Vitamin-C • Anthocyanin • Malic acid • Citric acid • High mucilage content 	<ul style="list-style-type: none"> • Protection due to presence of antioxidants. • Increased Natural collagen production. • Enhance wound healing. • Gives glowing skin. • Anti-ageing effect. • Increases skin elasticity. • Inhibit the activity of the enzyme elastase, causes break down of elastin. • Evens skin tone. • Organic acids • Mild exfoliating effect due to presence of organic acids. ✓ Purifies skin by breaking down dead skin. ✓ Increases cell turnover, helps in even tones. ✓ Control acne breakouts. • Mild astringent effect, reduces the appearance of large pores giving smooth feel to skin. • Anti-inflammatory effect. • Mucilage are natural skin moisturiser. 	<ul style="list-style-type: none"> • Protects with antioxidants action. • Nourishes and conditions hair making hair soft, and reduced hair fall. • Seals moisture in the shafts giving smoothness and silkiness.

<p>Marigold is herbaceous plants of <i>Tagetes erecta</i> Family - Asteraceae.</p>	<ul style="list-style-type: none"> • Flavonoids • Patuletin • Quercetagenin • Quercetin 	<ul style="list-style-type: none"> • Treat chronic skin diseases • Slows aging process. • Help in acne, pimples and sunburns because of cooling effect. • Moisturizes the skin. • Reduce inflammation. 	<ul style="list-style-type: none"> • Helps in growth of hair. • Decrease fall of hair • Helps in treating dandruff. • Helps the hair to regain their natural lustre.
<p>Rosa alba a perennial flower shrub of the genus <i>Rosa</i> belonging to the Family-Rosaceae.</p>	<ul style="list-style-type: none"> • Flavonoids • Anthraquinones • Saponins • Tannins • Mono-, tri-, sesqui-terpenes <ul style="list-style-type: none"> ✓ Geraniol ✓ Nerol ✓ Citral ✓ Carvacrol • Aldehydes <ul style="list-style-type: none"> ✓ Nonanal • Phenolic/alcoholic compounds <ul style="list-style-type: none"> ✓ Eugenol ✓ Nonanol ✓ Myrtenol • Minerals 	<p>Protects the skin due to</p> <ul style="list-style-type: none"> • Antioxidant activity. • Antimicrobial activity. • Anti-inflammatory. 	<p>Protects the hair due to its antioxidant activity and antimicrobial activity.</p>

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