



The Hidden Dangers: A Review of Hazardous Chemicals in Cosmetic

Authors	Affiliations	Mobile No.	E-mail	Institutional addresses
Mr. Harsh Pradip Belore*	Student of Bachelor of Pharmacy (4 th year)	8208596702	Harshbelore3@gmail.com	P. R. PATIL INSTITUTE OF PHARMACY , Talegaon (S.P.), Wardha
Miss. Khushi Rajendra Surywanshi*	Student of Bachelor of Pharmacy (4 th year)	9309045318	khushisurywanshi8@gmail.com	P. R. PATIL INSTITUTE OF PHARMACY , Talegaon (S.P.), Wardha
Mr. Lokesh Sahebrao Patke*	Student of Bachelor of Pharmacy (4 th year)	7391945100	lokeshpatke92@gmail.com	P. R. PATIL INSTITUTE OF PHARMACY , Talegaon (S.P.), Wardha
Miss. Samruddhi Khonde*	Assistant Professor	8888004718	khondesamruddhi06@gmail.com Research ID- https://orcid.org/0000-0002-7955-6399	P. R. PATIL INSTITUTE OF PHARMACY , Talegaon (S.P.), Wardha

Corresponding Authors	Affiliations	Institutional addresses
Dr.Koshish Gabhane	Associate	P. R. PATIL INSTITUTE OF PHARMACY , Talegaon (S.P.), Wardha
Dr. Vikrant Salode	Associate	P. R. PATIL INSTITUTE OF PHARMACY , Talegaon (S.P.), Wardha

Abstract-

Cosmetic products are used more than any other personal care product, and many cosmetic products contain harmful chemicals that can cause serious health problems in humans. This narrative review focused on some of the common toxic chemicals that are present in cosmetics including parabens, phthalates, synthetic fragrance and preservative as well as their possible deleterious effects. Long-term contact with these chemicals has been associated with skin irritation, allergic reactions, endocrine disruption and cancer. These chemicals are hazardous as the study mentions, outlining several diseases and disorders that they might eventually lead to dermatitis, hormonal unbalances as well as long-term health risks. Moreover, the review describes safer alternatives to replace these harmful cosmetic ingredients and encourages natural and/or organic materials in cosmetics. Ultimately, with the growing demand for ingredient transparency and a move towards safer alternatives to harmful products will help minimize health risks arising from cosmetics. As consumers, we need to protect skin health by choosing natural and sustainable options with minimal exposure to harmful chemicals.

Key words - Hazardous chemicals, Cosmetics , Diseases, Alternative chemicals ,
Side-effects, Formulation

1. Introduction

The use of cosmetics varies significantly across age groups, highlighting different beauty preferences and skincare needs. According to recent data, younger individuals, particularly those under 19 years of age, show the highest engagement with cosmetics, with 28.3% using them regularly. This is followed by women aged 20-29 years, at 21.4%, and 40-49 years, at 19.5%. Cosmetic use decreases with age, with only 15.4% of women aged 30-39 and 9.7% of women aged 50-59 using cosmetics frequently. The lowest usage is observed among women aged 60 and older, at 5.7%. [1]

This trend may reflect changes in lifestyle, beauty ideals, and health considerations as women age, as well as increased awareness of potential long-term effects of cosmetic products. Many cosmetics contain various synthetic chemicals, including preservatives, fragrances, and coloring agents, which are used to enhance product effectiveness and appeal. However, prolonged and early use of such chemicals can accelerate the skin's aging process, leading to premature wrinkles and loss of skin elasticity. Moreover, some chemicals commonly found in cosmetics have been linked to adverse health effects, including allergic reactions, hormone disruption, and, in severe cases, an increased risk of diseases such as dermatitis and even certain cancers. These concerns emphasize the need for safer formulations and increased awareness about the potential risks associated with long-term cosmetic use, particularly among younger consumers who may be exposed to these products from an early age.

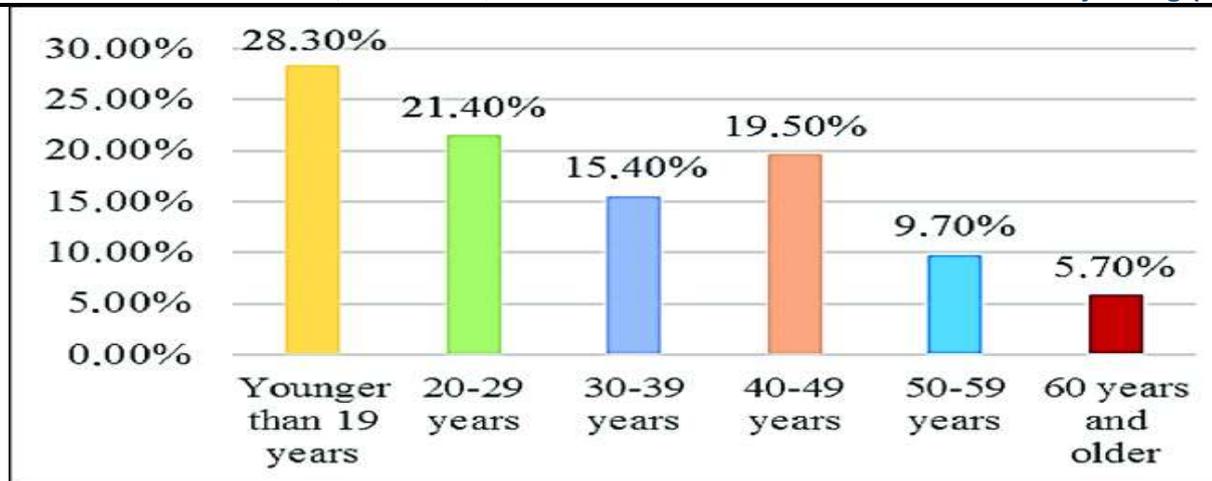


Fig. No: 1 Use of Cosmetics by women according to age: Younger than 19 years; 20-29 years; 30-39 years; 40-49 years; 50-59 years; 60 years and older [1]Role of Chemicals in Cosmetics:

Chemicals in personal care and makeup products play crucial roles, serving functions that range from preservation and fragrance enhancement to providing sun protection and improving the texture and feel of the product. Preservatives, for instance, are added to prevent microbial growth, extending the shelf life and safety of the products. Fragrances create a pleasant sensory experience, while UV filters protect the skin from harmful solar radiation. Emollients and smoothing agents make products feel smooth and luxurious upon application. Additionally, cosmetic formulations are tailored to meet specific needs and achieve desired effects, such as hydration, anti-aging, or long-lasting wear. The diversity and precision of chemical plays roles in cosmetics allow manufacturers to create a wide range of products suited to various consumer preferences and requirements. Various chemicals are used like zinc oxide and octanoate protect the skin from the sun's harmful rays (Sun protection); Iron oxides, titanium dioxide, and other dyes create a wide range of colours (pigmentation); Emollients like mineral oil, petroleum jelly, and glycerine make cosmetics smooth and easy to apply, and make skin feel softer (Moisturization and skin softening), some other examples of chemical used in the formulation are listed below in the hexagonal radial figure no.2.

Chemicals play an essential role in cosmetics, serving multiple functions that enhance appearance, ensure safety, and prolong shelf life. For instance, colorants like titanium dioxide and iron oxides provide vibrant pigmentation in products such as lipsticks and eyeshadows. Preservatives, including parabens and phenoxyethanol, prevent microbial growth, extending the shelf life of creams and lotions. Emollients like glycerine and dimethicone moisturize and soften the skin, commonly found in foundations and body lotions. Surfactants, such as sodium lauryl sulphate, facilitate cleansing by allowing water to mix with oil and dirt, often used in shampoos and body washes. Thickeners like carbomers and xanthan gum adjust product viscosity, enhancing the texture of gels and creams. Fragrances, whether synthetic or derived from essential oils, improve the sensory experience in perfumes and lotions. Additionally, active ingredients such as retinol and hyaluronic acid target specific skin concerns, making them popular in serums and anti-aging products. Together, these chemicals work in harmony to create effective and appealing cosmetics while ensuring safety and stability.[2]

1. Aim & Objectives

Aim -

- To review the hazardous chemicals in cosmetic and identify their potential risk, and suggest safer alternative chemical for skin health.

Objective –

- To identify and list of hazardous chemicals used in cosmetics.
- To Highlight diseases and disorders caused by hazardous chemicals present in cosmetics.
- To explore and recommend safer non toxic alternatives that could replace harmful chemicals in cosmetics.



2. Hazardous chemicals

A hazardous chemical is a substance that poses a risk to health, safety, and the environment if not handled properly.[3] Hazardous chemicals are substances that can cause adverse health effects such as poisoning, breathing problems, skin rashes, allergic reactions, allergic sensitisation, cancer, and other health problems from exposure [4]

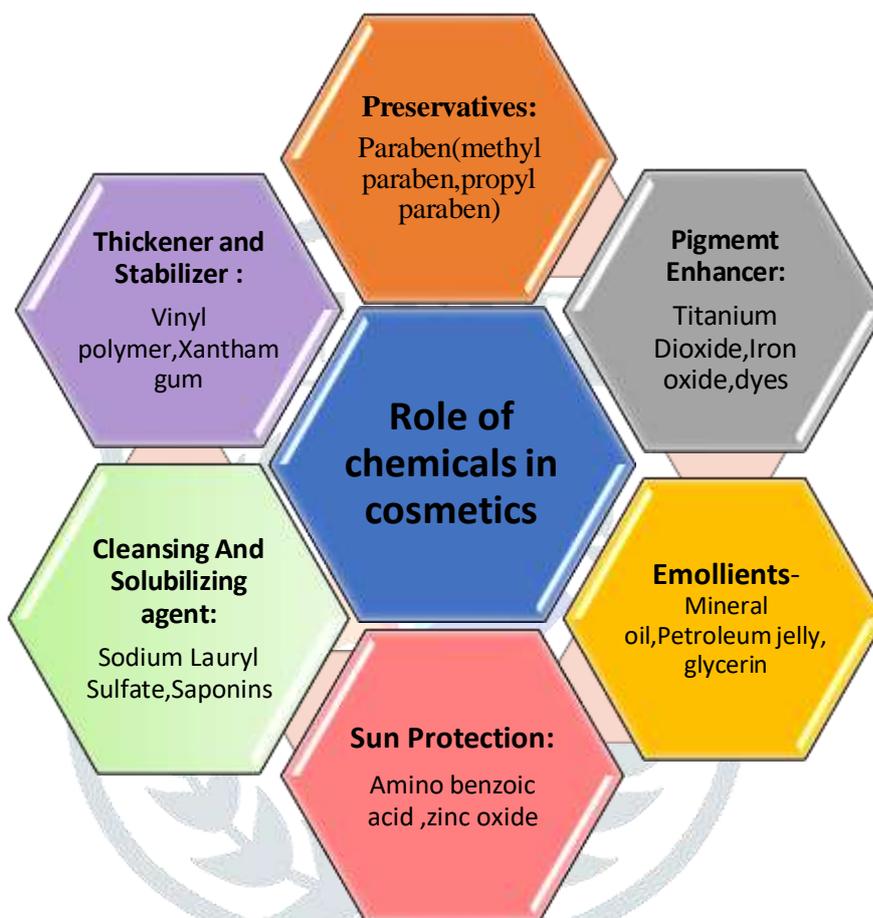


Fig. No. 2 Role of chemicals in cosmetics

“Cosmetics are the products of any substance or mixture intended to be placed in contact with external parts of human body (epidermis, hair system, nails, and lips) or with teeth and mucous membranes of oral cavity with view of cleaning them, perfuming them, changing their looks, protecting them, maintaining them, or correcting body odours".[5]

All these cosmetics contains some chemicals some of them are useful while some are harmful causes various health issues, like sodium lauryl sulphate used as cleaning agent (surfactant) commonly used in many formulations for the cleaning purpose. Long-term use of this agent cause side effect like neurological damage, irritation, Eye damage. Parabens are used as

preservatives which are used to prevent the growth of microorganism. It easily penetrates into the skin and interferes with hormonal function. They are associated with neurotoxicity and cancer among other adverse health effects. such hazardous chemicals and their side effects are mentioned in the following table no.1 [6]

3.1. Identification of Hazardous Chemicals in Cosmetics

Identification of Hazardous Chemicals in Cosmetics can be done by Following these steps -

1. Check the Ingredients List: By law, cosmetic products must list ingredients in descending order of quantity. Familiarize commonly flagged chemicals like parabens, phthalates, formaldehyde, and artificial fragrances, which can potentially pose health risks.

2. Use Apps and Databases: Several apps and online resources can help to analyse cosmetic ingredients Environmental Working Group's Skin-Deep Database rates products based on safety. Think Dirty app lets you scan products to see potential harmful ingredients. INCI Decoder provides ingredient breakdowns with explanations for each component.

3. Look for Key Terms: Certain labels indicate potentially hazardous chemicals: "Fragrance" or "P": These can contain undisclosed synthetic chemicals. "PEG" Compounds: Polyethylene glycol can be contaminated with carcinogens. "Sulphates" (SLS, SLES): Can be harsh on skin and cause irritation. "Parabens" (Methylparaben, Propylparaben): Linked to hormone disruption. "Phthalates": Commonly used in fragrances and linked to hormone disruption.

4. Avoid Known Harmful Ingredients: Some common harmful ingredients examples include: Formaldehyde-releasing preservatives: Like DMDM hydantoin and quaternium-15. Triclosan and Triclocarban: Often found in antibacterial products. Oxybenzone and Octinoxate: Found in sunscreens, potentially linked to hormone disruption.

5. Research Ingredients: Detail research of any ingredients leads to good understanding of potential risks caused by that chemical. The FDA and the European Chemicals Agency (ECHA) also have lists of restricted or banned substances that can be a reference.

6. Choose Certified Products: Look for certifications like "USDA Organic," "EWG Verified," or "EcoCert" that ensure certain safety standards and restrictions on harmful chemicals.[7]

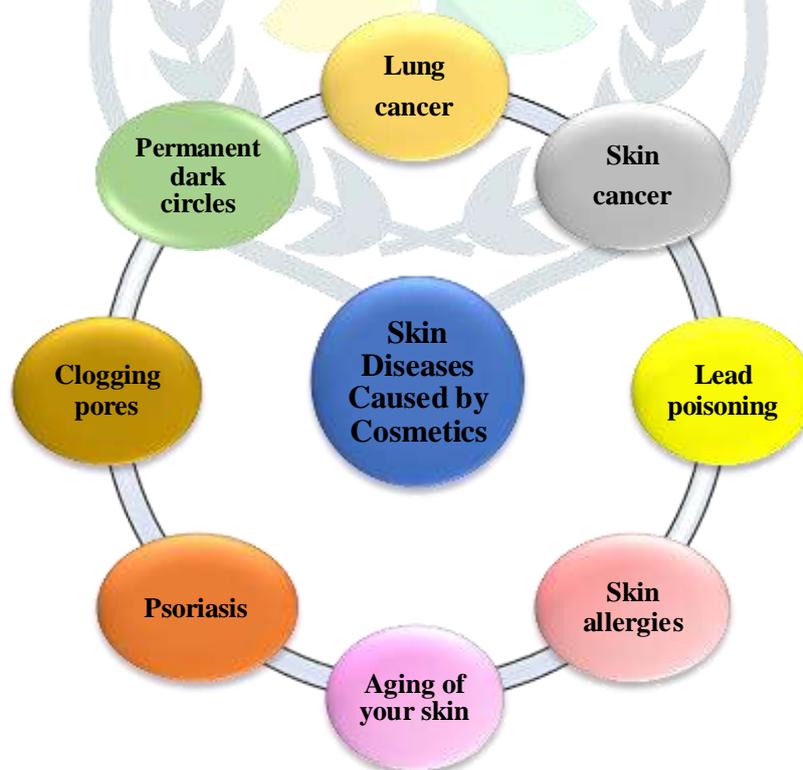
Table No. 1 List of Hazardous Chemicals with their side effects

Formulation	Hazardous Chemicals	Side effects
Shampoo	Sodium lauryl sulphate Propylene glycol	Renal dysfunction Irritation Eye damage
Eye shadow	Polyethylene Terephthalate	Cancer, Infertility, Hormonal disruptions Organ damage
Hair spray	Octinoxate Isophthalates	Skin Irritation, Rash,Itching
Deodorants	Aluminium zirconium Isopropyl myristate	Organ irritation Hormonal disruptions
Lipstick	Poly (methyl Metha-acrylate)	Allergies, Cancer
Blush	Ethyl paraben Methyl paraben	Irritation Hormonal disruptions
Foundation	Diethanolamine (DEA)	Allergies, Cancer, Immune system disruption
Nail varnish	Phthalates	Hormonal disruptions, Fertility issues
Body lotion	Methyl paraben Propyl paraben Polyethylene glycol	Rash, Irritation Hormonal disruption
Perfume	Benza aldehyde Toluene	Sperm damage, Organ irritation

3.2. Diseases Caused by Hazardous Chemicals:

In addition to possible poor outcomes related to skin health, cosmetics also present several dangers that can affect the overall health and wellness of an individual. When lung tissues are exposed to such chemicals during inhalation, it can result in damage and thus a higher probability of lung cancer. In addition, it is a cause of skin cancers which are used again and again in formaldehyde and parabens containing products. The skin, being delicate around the eyes is particularly sensitive and dark circles can be caused by too much cosmetics that contain harsh chemicals causing you to have bags under your eyes as well. In addition, some makeup products which create an even look but in reality, they are clogging pores causing acne to appear together with other problems that can reduce the oxygen and cause a bacteria or fungal infection. Overuse of makeup will also make you look older permanently; this is because it leads to more wrinkles longer earlier due to disastrous effects on your skin and can dry out by taking away the oils/moist that are supposed to keep them supple. Certain lipsticks might also contain lead which has harmful effects with repeated application such as brain damage and loss of coordination. Cosmetics with alcohol can eventually cause skin rashes that lead to itching and even permanent spots if not suitable for the type of each person. In the end, it is seen that using too much or not proper products can cause a lot of health and skin issues. Below listed images showing various diseases cause to specific part of body by the use cosmetic [8]

Fig. No. 3 Skin Diseases caused by Hazardous Chemicals



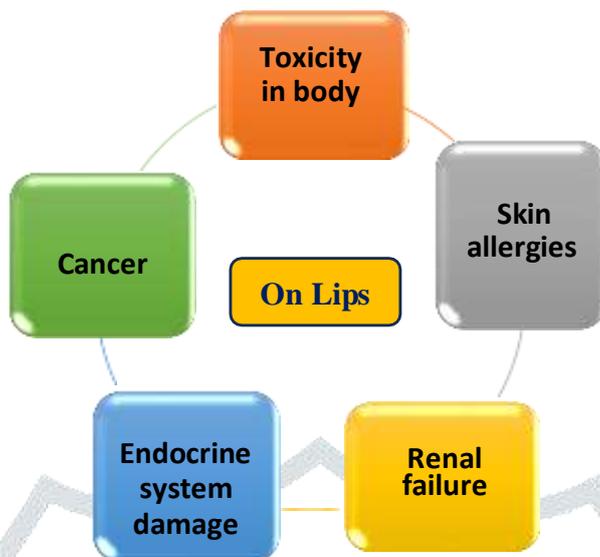


Fig.No. 4 Lips diseases caused by Lips care and beautification cosmetics

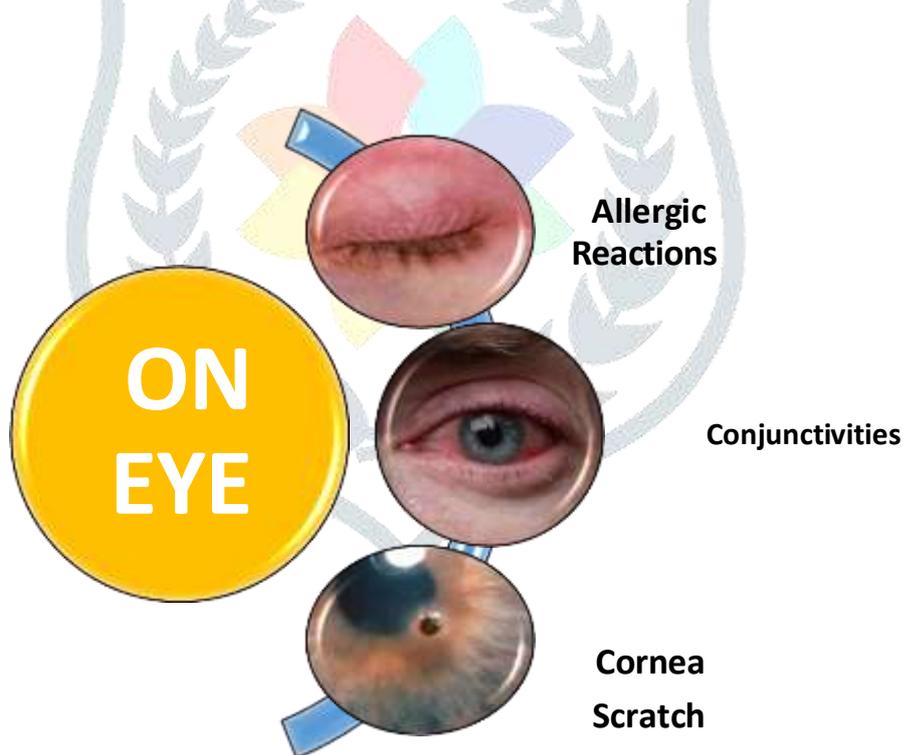


Fig. No. 5 Eye diseases Caused by the Eye Beautification Cosmetic

Figure No. 4 shows some substances used in lip products carry significant health risks. These risks include toxicity in the body, where harmful chemicals may accumulate and affect overall health. Additionally, certain ingredients can cause skin allergies, leading to irritation or adverse reactions. Some compounds have even been linked to cancer, raising serious concerns about their long-term use. Certain chemicals can also disrupt the endocrine system, potentially affecting hormonal balance. Lastly, there is a risk of renal failure, as some ingredients may contribute to kidney damage. This highlights the importance of scrutinizing the ingredients in lip products to ensure they are safe for use.[9]

Figure No. 5 highlights three major health concerns associated with eye care and the use of certain products. First, allergic reactions around the eyes can occur due to certain ingredients, causing symptoms like redness, swelling, and discomfort. Another issue shown is conjunctivitis, an infection or inflammation of the eye's conjunctiva, leading to redness, itching, and possible discharge. Lastly, exposure to irritants or foreign objects may cause corneal scratches, or corneal abrasions, which are painful and may require prompt medical attention to prevent infection. These risks emphasize the importance of using safe, high-quality products and handling the eye area with caution to maintain eye health.[10]

Figure No.6 Shows Hair-related conditions can significantly impact scalp health and overall well-being. Scalp psoriasis is a chronic issue characterized by dry, itchy patches that can crack and bleed, affecting about half of those with the condition. Dandruff presents as white flakes due to a buildup of dead skin, often linked to a skin fungus; while not contagious, it can be bothersome and is manageable with medicated shampoos. A more severe form, seborrheic dermatitis, involves redness and oily scales and is common in those with oily skin, acne, or psoriasis. In infants, cradle cap appears as greasy, yellowish scales and typically resolves by the first birthday, often treatable with gentle scalp massages and baby shampoo.

Head lice, prevalent among children aged 3 to 11, spread easily through shared items but do not indicate poor hygiene. Ringworm, a fungal infection that leads to round, scaly rashes and hair loss, is more common in younger children and requires antifungal treatment. Lastly, folliculitis is an inflammation of hair follicles, often caused by bacterial infections or irritation, resulting in small, pus-filled pimples. While some conditions may resolve on their own, others may need medical attention to ensure proper management and recovery.[11]



Fig. No. 6 Diseases Caused by the Hair Care Cosmetics

3.3. Prevention of Disease Propagation from Chemicals in Cosmetics To prevent diseases caused by cosmetics, it is essential to adopt a series of safe practices. First, always read product labels to check for ingredients and expiration dates before use.

Wash your hands thoroughly prior to applying any cosmetics to minimize the transfer of bacteria. Sharing cosmetics, particularly those that come into direct contact with the skin or eyes, should be avoided to prevent contamination. Proper storage is also crucial; keep cosmetics in a clean, dry place at room temperature and away from direct sunlight. Discard any products that change in colour or smell, as this may indicate spoilage. Using clean makeup tools, such as brushes and sponges, further reduces the risk of infection. Opting for cosmetics with fewer ingredients can lower the likelihood of allergic reactions, and performing a patch test on a small area of skin before using new products is advisable. For fragrances, consider applying them to clothing instead of directly on the skin to reduce irritation. Finally, always wash off cosmetics before bedtime to allow your skin to breathe

maintain its health. By following these guidelines, you can significantly minimize potential cosmetic-related health risks. [12-16]

➤ **Strict Regulation and Ingredient Restrictions:**

- Advocate for the enforcement of stricter regulations on cosmetic ingredients, banning or limiting the use of known harmful chemicals like parabens, sulfates, phthalates, and formaldehyde-releasing agents.
- Push for regulations that require thorough safety assessments of all ingredients before they are allowed in cosmetic products.

➤ **Clear Ingredient Labeling and Transparency:**

- Mandate full ingredient disclosure on packaging, making it easier for consumers to identify potentially harmful substances.
- Establish clear labeling for allergens, irritants, and chemicals with known health risks, helping consumers avoid problematic ingredients.

➤ **Promotion of Non-Toxic Alternatives:**

- Encourage the use of natural or less-toxic alternatives, such as plant-based ingredients, that have a lower risk of skin irritation or long-term harm.
- Support the development and marketing of "clean beauty" products that prioritize skin safety, free from known harmful chemicals.

➤ **Dermatologist-Approved Products:**

- Recommend that cosmetic brands partner with dermatologists to test and validate the safety of their products for different skin types, including sensitive skin.
- Encourage the development of hypoallergenic and non-comedogenic products, which are less likely to cause irritation or clog pores.

➤ **Consumer Education and Awareness:**

- Educate consumers about the potential risks of hazardous chemicals in cosmetics and how to read labels effectively.
- Promote online resources and apps that help consumers identify harmful ingredients in their beauty products.

➤ **Encourage Patch Testing and Personal Sensitivity Awareness:**

- Advise consumers to conduct patch tests before using a new product, especially those with sensitive skin, to detect potential allergic reactions or irritation.
- Recommend customized skincare products or routines that minimize exposure to harsh chemicals, tailored to individual skin sensitivities.

➤ **Support for Research and Safe Testing Methods:**

- Advocate for the use of alternative testing methods, such as in vitro (cell-based) tests or non-animal testing protocols, to assess the safety of cosmetic ingredients without harming the skin or animals.
- Encourage continuous research into safer chemical alternatives that can provide effective results without damaging the skin's natural barrier.

➤ **Minimize Use of Fragrances and Dyes:**

- Reduce the use of synthetic fragrances and artificial colorants in cosmetics, which are common culprits for skin irritation and allergic reactions.
- Promote fragrance-free or naturally-scented products as alternatives, particularly for individuals with sensitive or reactive skin.

➤ **Advocacy for Sustainable and Ethical Practices:**

- Encourage cosmetic companies to adopt ethical and sustainable manufacturing practices that prioritize consumer health over profits.
- Support brands that use non-toxic, ethically sourced ingredients, reducing the overall environmental and skin impact of cosmetic products.

➤ **Routine Review and Regulation of Existing Products:**

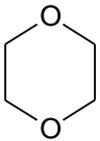
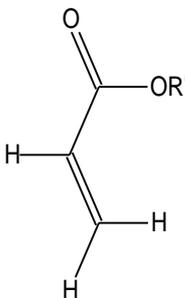
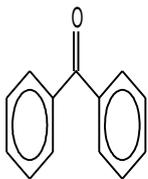
- Advocate for periodic review and reformulation of existing products to remove or replace harmful ingredients as more information becomes available.
- Encourage stricter enforcement of safety standards, with regular checks to ensure that harmful substances do not re-enter the market.

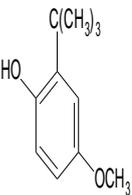
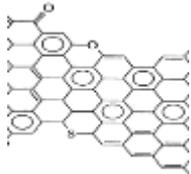
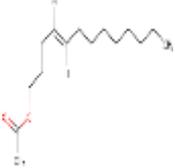
By taking these steps, we can better protect consumers from the potential harms of hazardous chemicals in cosmetics, promoting safer skincare practices and healthier skin.[12-16]

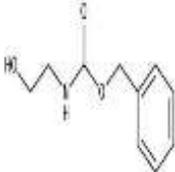
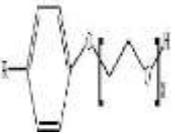
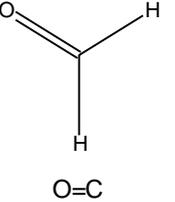
3. Alternative Chemicals

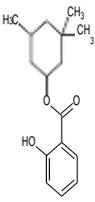
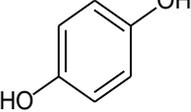
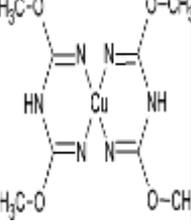
In cosmetics, various alternative ingredients are commonly used to address skin concerns like hyperpigmentation, aging, and inflammation with a focus on reducing irritation and sensitivity. Niacinamide (Vitamin B3) is widely used for its anti-inflammatory properties, helping to improve skin texture and reduce dark spots. Azelaic acid, known for its antibacterial effects, treats acne and pigmentation, making it ideal for sensitive or rosacea-prone skin. Vitamin C, a potent antioxidant, brightens the skin by inhibiting melanin production, although it requires stabilizers for effectiveness. Licorice extract, containing glabridin, soothes and lightens the skin, while arbutin, derived from bearberry plants, serves as a milder alternative to hydroquinone for brightening. Kojic acid, derived from fungi, reduces pigmentation, though it may irritate sensitive skin. Tranexamic acid, found in products like Rejisure, decreases melanin production and is suitable for sensitive skin when well-formulated. Additionally, hyaluronic acid hydrates the skin, enhancing brightness and smoothness, while peptides aid in skin repair and firmness, indirectly promoting an even complexion. These ingredients, when used at proper concentrations, offer a safer approach to skin brightening and anti-aging.[12],[16-17]

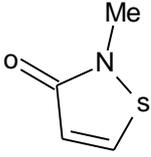
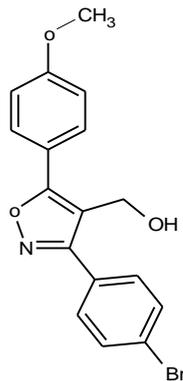
Table No. 2 Summary of Some Hazardous Chemicals Concluded with use, side effects, diseases and alternative Chemicals [5], [20]

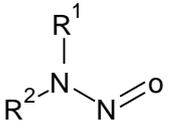
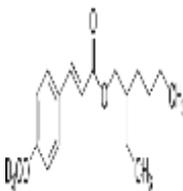
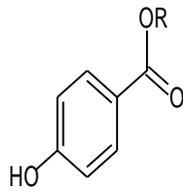
Sr. No	Name of chemical	Formulation used in	Use for	Side effects / Diseases	Alternative chemical
1)	1,4 Dioxane  O1CCOCC1	Shampoo	Stabilizer	-Breast Cancer -Birth defects	Sodium gluconate
2)	Acrylates 	Nail products (Acrylic nails, Nail enhancing polishes)	Adhesives	-Adverse skin and eye, throat reactions -Oesophageal cancers -Myeloproliferative cancers -Toxic to lungs -Cause damage to nasal passages, liver, kidney and GIT -Peripheral nerve damage	Xanthan gum
3)	Benzophenone  O=C(c1ccccc1)c1ccccc1	Lip Balm Nail polish Sunscreen	Sun screening agent	-Human Carcinogen -Endocrine disruptor -Liver hypertrophy -Cause hepatotoxicity in blood, kidneys, liver	Titanium dioxide

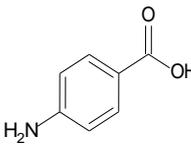
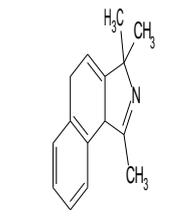
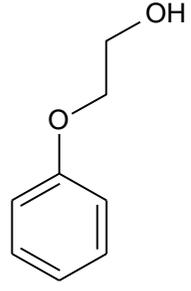
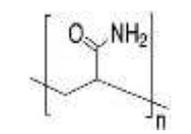
4)	<p>Butylated Compounds (BHA, BHT)</p>  <chem>COc1cc(c(O)cc1)C(C)(C)C</chem>	<p>Lip and hair products Sunscreen</p>	<p>Antioxidant Preservatives</p>	<p>-Endocrine disruptor, Carcinogenicity, -Cytotoxic effects, -Damage to cellular level, Respiratory irritant</p>	<p>VITAMIN C VITAMIN E</p>
5)	<p>Carbon black</p> 	<p>Eyeliners Mascara Lipstick Nail polish Eye shadow Blushers Foundation</p>	<p>Black Pigment</p>	<p>-Human Carcinogen, -Lung diseases, -Cardiovascular risk, -Platelet hyper-reactivity</p>	<p>Black iron oxide (Magnetite)</p>
6)	<p>Coal tar</p> 	<p>Shampoos Soap Hair dyes Lotions</p>	<p>Biocide Denaturant Anti-dandruff agent</p>	<p>-Cancer (Skin, lungs, bladder, kidney, digestive tract cancer) -Neurological damage -Emotional and sleep disturbances -Loss of co-ordination</p>	<p>Sodium shale oil sulfonate</p>

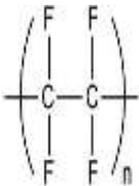
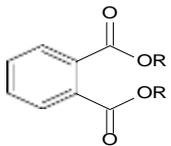
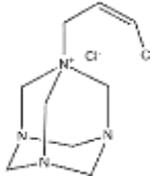
7)	<p>Ethanolamine compounds</p> 	<p>Soaps Shampoos Hair conditioners Dyes Lotions Shaving creams Eyeliners</p>	<p>PH adjuster Emulsion stabilizer Fragrances</p>	<p>-Hepatocarcinogenic in females -Affects human male reproductive health -Alters sperm structure -Causing Abnormalities that affect the sperm's ability to swim and fertilize the egg</p>	<p>Lecithin (Canola seeds)</p>
8)	<p>Ethoxylated ingredients</p> 	<p>Shampoos Soaps Bubble baths Hair relaxers</p>	<p>Improves solubility And dispersibility Provides smooth and creamy texture</p>	<p>-Lymphoma -Leukaemia -Stomach and Breast cancer</p>	<p>Natural Vegetable Glycerine</p>
9)	<p>Formaldehyde</p> 	<p>Nail polish Nail glue Hair gel Baby shampoos Body soaps Body wash</p>	<p>Preservatives Colorants</p>	<p>-Myeloid leukaemia -Cancers of paranasal sinuses, -Nasal cavity, -Nasopharynx</p>	<p>Sodium benzoate</p>

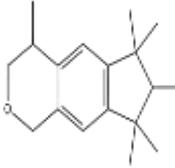
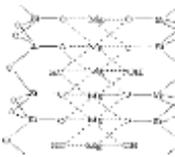
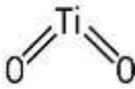
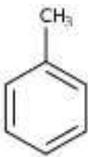
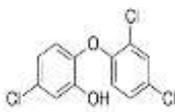
<p>10)</p>	<p>Homosalate</p>  <p>CC1(C)CC(O)CC(OC(=O)C2CC(C)C2)C1</p>	<p>Sunscreens</p>	<p>Sun Protecting Factor (SPF) Or Sun filter</p>	<p>-Endocrine Disruptor (impacts androgens and progesterone systems) -Breast cancer</p>	<p>Zinc oxide</p>
<p>11)</p>	<p>Hydroquinon e</p>  <p>Oc1ccc(O)cc1</p>	<p>Skin Lightner's Facial and Skin cleansers Facial moisturizers Hair conditioners</p>	<p>Skin Lightener</p>	<p>-Skin cancer -Ochronosis (skin thickens and turns bluish grey) -Permanent corneal damage -Irritation of nose, throat, and upper respiratory tract,Cough, Decreased lung capacity</p>	<p>Arbutin (Bearberry extract)</p>
<p>12)</p>	<p>Heavy metals</p> 	<p>Lipstick Whitening toothpaste Eyeliners Nail colours Foundations Sunscreens Eye shadow</p>	<p>To accelerate the affect</p>	<p>-Reduce fertility in men and women -Hormonal changes and irregularities -Miscarriage -Nervous system toxicity -Disrupt thyroid hormones -Neurotoxicity</p>	<p>Titanium dioxide Iron oxide</p>

13)	<p>Methylisothiazolinone (MIT), Methylchloro isothiazolinone (CMIT)</p>  <p>MIT</p>	<p>Shampoos Conditioner Hair colours Body wash Lotions Sunscreens Mascara Shaving creams</p>	<p>Preservatives</p>	<p>-Body weight gain -Death -Reddened lungs -Swollen intestines -Neurotoxicity</p>	<p>Sodium benzoate</p>
14)	<p>MICA</p> 	<p>Makeup foundations</p>	<p>Colour additives Reflective properties Shimmery effect</p>	<p>-Respiratory irritant -Lung scarring -Coughing -Shortness of breath -Weakness -Weight loss</p>	<p>Fluorophlogopite</p>
15)	<p>Nanoparticles</p>	<p>Deodorant's Toothpaste Shampoos Lotions Foundations Anti-aging creams Nail polish</p>	<p>UV- filters Preservatives</p>	<p>-Inhalation -Oxidative stress</p>	<p>Natural and organic ingredients such as vegetables oils, shea butter, cocoa butter</p>

16)	<p>Nitrosamines</p> 	<p>Mascara Concealer Conditioner Baby shampoo</p>	<p>Wetting agents</p>	<p>-Endocrine disruption -Human carcinogen -Hepatotoxin -Liver Fibrosis -Organ system toxicity</p>	<p>Alginates</p>
17)	<p>Octinoxate</p> 	<p>Hair colour products Shampoos Sunscreen Lipstick</p>	<p>UV-B rays filter</p>	<p>-Breast cancer -Reduce level of thyroid hormones in blood serum -Exhibits Anti-androgenic activity -Effects on reproductive organ development in male and female foetus exposed in uterus</p>	<p>Zinc oxide</p>
18)	<p>Parabens</p> 	<p>Shampoos Conditioner Lotions Facial and shower cleansers Scrubs</p>	<p>Preservatives</p>	<p>-Endocrine disruptors -Development of malignant melanoma -Developmental and reproductive toxicity</p>	<p>Sodium benzoate</p>

19)	<p>PABA</p>  <p><chem>OC(=O)c1ccc(N)cc1</chem></p>	Sunscreens	UV-B filters	<p>-Disrupt thyroid activity</p> <p>-Damages DNA</p> <p>-Skin cancer</p>	<p>Padimate O (OD-PABA)</p> <p>Titanium dioxide or Zinc oxide</p>
20)	<p>Petrolatum</p>  <p><chem>CC1(C)N=C(C)C2C1=CCc1ccccc21</chem></p>	Lotions	Moisturizing agent	-Human carcinogen	VEGELINE
21)	<p>Phenoxyethanol</p> 	<p>Perfumes</p> <p>Soaps (liquid and bars)</p> <p>Moisturizer</p> <p>Lotions</p> <p>Eye shadows</p> <p>Foundation</p> <p>Sunscreens</p>	<p>Preservatives</p> <p>Stabilizers</p>	<p>-Eczema Severe life-threatening allergic reactions</p> <p>-Affect nervous system functions</p>	<p>Ethyhexyl glycerine</p> <p>Leuconostoc/Radish root ferment filtrate</p> <p>Sodium benzoate</p>
22)	<p>Polyacrylamide</p> 	<p>Lotions</p> <p>Moisturizer</p> <p>Anti-aging products</p> <p>Colour cosmetics</p> <p>Lotions</p>	<p>Binders</p> <p>Stabilizers</p>	<p>-Human carcinogen</p> <p>-Developmental and reproductive toxicity</p>	<p>Activate starch</p>

23)	<p>Polytetra-fluoroethylene (PTFE, TEFLON)</p> 	<p>Foundation Pressed powders Loose powders Bronzer Blush Eye shadow Mascara Shave gel Lip balm Anti-ageing creams</p>	<p>Emollient Aesthetic enhancer Compacting Super fatting agent</p>	<p>-Human carcinogen -Endocrine disruptor -Disrupting oestrogen receptors, -Thyroid receptors, steroid hormones and male testosterone levels delayed puberty in girls</p>	<p>Fatty acids derived from Estolide oils Bio-degradable synthetic wax with boron nitride and zinc oxide</p>
24)	<p>P-Phenylene diaine (Para – PPD)</p> 	Hair dyes	Dyes	<p>-Skin allergens -Strongly mutagenic -Human carcinogenic -Hair dye poisoning -Respiratory distress -Renal failure</p>	Para -toluene diamine sulphate (PTDS)
25)	<p>Phthalates</p> 	<p>Colour cosmetics Fragranced lotions Body washes</p>	<p>Plasticizer Colorant Fragrance</p>	<p>-Endocrine disruption -Developmental and reproductive toxicity</p>	Di (isononyl) Cyclohexane-1,dicarboxylate
26)	<p>Quaternium-15</p> 	<p>Hair conditioners Hair styling products Creams</p>	Preservatives	<p>-Human skin toxicants -Allergen -Eye irritant</p>	Azonium Adamantane

30)	Synthetic Musk's 	Perfumes Colognes Scented soaps Body wash Sprays Lotions Hair products	Fragrance (Pleasant scent)	-Alter oestrogen activity -Inhibit androgen and progesterone -Gynaecological abnormalities	Botanical or plant derived musk's (ambrette seed, musk wood, angelica, Musk flower)
31)	TALC 	Baby powder Baby shower products Lotions	Absorb Moisture Fragrance	-Human carcinogen Endometrial and ovarian cancer	Baking Sada Corn starch Kaolin clay Oat flour
32)	Titanium dioxide 	Sunscreens Pressed powders Loose powders	UV – filter Whitening agent	-Human carcinogen	Lithopone
33)	Toluene 	Nail product Hair dyes	Thinner Adhesives Suspend the chloroform a smooth finish	-Headaches -Dizziness -Cracked skin -Reproductive damage -Respiratory complications	Polychem 36
34)	Triclosan 	Antibacterial soaps Toothpaste Deodorants Shaving products	Antimicrobial Preservatives Biocide	-Decreased thyroid hormone concentration	Benzalkonium chloride Chloroxylenol Chlorhexidin

4. Conclusion :

This review work describe hazardous chemicals used in various cosmetics pose a serious risk to our health, with many linked to skin irritation, allergies, hormonal disruption, and even cancer. Chemicals like parabens, phthalates, and synthetic fragrances are commonly used in cosmetic products, but their potential harms often outweigh their benefits. Prolonged exposure can lead to various health issues, such as dermatitis, allergic reactions, and long-term risks like endocrine disruption and cancer. To protect ourselves, it's important to become more informed about the ingredients in our beauty products and demand greater transparency from manufacturers. Choosing safer, non-toxic alternatives and supporting natural, organic products can help reduce these risks.

5. Future Scope :

The future of cosmetics free from hazardous chemicals holds great potential as research advances and consumer awareness grows. Key areas for development include better testing methods to identify harmful chemicals and stronger global regulations to limit their use. As demand for natural and organic alternatives increases, further research can explore their effectiveness and sustainability compared to traditional ingredients. Public education will also be vital in promoting transparency and encouraging safer, eco-friendly products. Together, these efforts can lead to a future where beauty products are both safe and effective for consumers and the environment.

6. References :

- 1) Dmitry V. Shkurkin¹, Ekaterina V. Shevchenko, et. Al.; "The Evolution of Characteristics of Gender Stereotypes in Modern Advertising as a Reflection of Consumer Demand," *Pertanika Journal of Social Science and Humanities*, (2017), 25, 179-194
- 2) ChemicalSafetyFacts.org [Internet]. Information on chemicals in everyday life, *Health and Safety* » Chemistry of Cosmetics: 20 Chemicals in Personal Care Products; c2023 [cited 2023 Jul 19]. Available from: <https://www.chemicalsafetyfacts.org/health-and-safety/chemistry-of-cosmetics-20-chemicals-that-make-up-personal-care-products/#:~:text=Chemicals%20in%20personal%20care%20and,are%20used%20in%20your%20cosmetics>
- 3) Hazardous Chemical, In subject area: Computer Science ,School Security(Second Edition); c2021. Available from: <https://www.sciencedirect.com/topics/computer-science/hazardous-chemical>
- 4) [https://www.qld.gov.au/\[Internet\]](https://www.qld.gov.au/[Internet]) Queensland Government, Queensland Business, Types of Hazardous

- Chemicals, Hazardous Chemicals;c2019[cited 2019 Jul 22]. Available from: [https://www.business.qld.gov.au/running-business/whs/hazardous-chemicals/types#:~:text=Hazardous%20chemicals%20are%20substances%20that,acutely%20\(highly\)%20toxic%20substances](https://www.business.qld.gov.au/running-business/whs/hazardous-chemicals/types#:~:text=Hazardous%20chemicals%20are%20substances%20that,acutely%20(highly)%20toxic%20substances)
- 5) Kale Neha.; “TOXIC CHEMICALS IN COSMETICS” ,Journal of World journal of Pharmaceutical Research,(2022), (11), Issue10,409-427.
 - 6) [Tauqeer Ahmad Rajput](#) , Side Effects of Cosmetics;c2019[cited 2019 Feb 12]. Available from:<https://www.scribd.com/document/399468925/Cosmetics>
 - 7) Safe Work Australia, Model Code Of Practice: Managing risks of hazardous chemicals in the Workplace;c2023[cited 2023 Jun 16]. Available from:<https://www.safeworkaustralia.gov.au/doc/model-code-practice-managing-risks-hazardous-chemicals-workplace>
 - 8) Increasing Use of Cosmetic Products & Their Side Effects, Published by Complete Medical Wellness (healthcare centre & a multi-specialty medical group);c2022. Available from:https://search.app/?link=https%3A%2F%2Fcompletemedicalwellness.com%2Fincreasing-use-of-cosmetic-products-their-side-effects%2F%23%3A~%3Atext%3DThe%2520chemical%2520ingredients%2520in%2520makeup%2Cand%2520infections%2520of%2520the%2520lungs.%26text%3DExcessive%2520cosmetic%2520use%2520can%2520lead%2Cformaldehyde%252C%2520which%2520increases%2520cancer%2520risk.&utm_campaign=aga&utm_source=agsadl1%2Csh%2F%2Fgs%2Fm2%2F4
 - 9) Geetika Sachdev , Wearing lipstick can be dangerous for your health , HEALTH SHOTS YOUR DAILY DOSE OF WELLNESS;c2021[cited 2021 Jul 29 ,10:12 AM IST]. Available from:https://search.app/?link=https%3A%2F%2Fwww.healthshots.com%2Fpreventive-care%2Fself-care%2Fworld-lipstick-day-harmful-effects-of-wearing-lipstick%2F&utm_campaign=aga&utm_source=agsadl1%2Csh%2F%2Fgs%2Fm2%2F4
 - 10) [Eye Problems Associated With Eye Makeup | How To Keep Your Eyes Safe?](#) Prasad Netralaya Super Speciality Eye Hospital;c2019. Available from:<https://prasadnetralaya.com/eye-problems-associated-with-eye-makeup/>
 - 11) [Debra JalimanMD, Stephanie Watson](#), Scalp Problems, WebMD;c2023 [cited 2023 Sep 18]. Available from:https://search.app/?link=https%3A%2F%2Fwww.webmd.com%2Fskin-problems-and-treatments%2Fscalp-problems&utm_campaign=aga&utm_source=agsadl1%2Csh%2F%2Fgs%2Fm2%2F4
 - 12) Cynthia Cobb, DNP, APRN, WHNP-BC, FAANP, Beth Sissons, MedicalNewsToday, Are some makeup

ingredients toxic? c2019[cited 2019 Dec 16]. Available

from:https://search.app/?link=https%3A%2F%2Fwww.medicalnewstoday.com%2Farticles%2F327318&utm_campaign=aga&utm_source=agsadl1%2Csh%2Ffx%2Fgs%2Fm2%2F4

- 13) Dan Brennan MD, WebMD Editorial Contributors, Skin Reactions to Beauty Products; c2023 [cited 2023 April 18]. Available from: https://search.app/?link=https%3A%2F%2Fwww.webmd.com%2Fallergies%2Fcosmetics&utm_campaign=aga&utm_source=agsadl1%2Csh%2Ffx%2Fgs%2Fm2%2F4
- 14) Paula Ludmann MS, American Academy of Dermatology Association, WHEN TO TOSS YOUR MAKEUP AND SUNSCREEN; c2024 [cited 2025 May 15]. Available from: https://search.app/?link=https%3A%2F%2Fwww.aad.org%2Fpublic%2Feveryday-care%2Fskin-care-secrets%2Fprevent-skin-problems%2Freplace-makeup-sunscreen&utm_campaign=aga&utm_source=agsadl1%2Csh%2Ffx%2Fgs%2Fm2%2F4
- 15) Heather M Trevino BSN RNC, University of Rochester Medical Center New York, How Safe Are Cosmetics and Personal Care products? c2024. Available from: https://search.app/?link=https%3A%2F%2Fwww.urmc.rochester.edu%2Fencyclopedia%2Fcontent.aspx%3Fcontenttypeid%3D1%26contentid%3D4498%23%3A~%3Atext%3DCosmetics%2520and%2520personal%2520care%2520items%2Cdon%27t%2520use%2520them%2520correctly.&utm_campaign=aga&utm_source=agsadl1%2Csh%2Ffx%2Fgs%2Fm2%2F4
- 16) FDA [Internet]. Using Chemicals Safely; c2024 [cited 2024 Oct 15]. Available from: <https://www.fda.gov/cosmetics/resources-consumers-cosmetics/using-cosmetics-safely>
- 17) BCPP.org [Internet]. Campaign for Safe Cosmetics, Top 5 Safe Cosmetics Tips; c2024. Available from: https://search.app/?link=https%3A%2F%2Fwww.safecosmetics.org%2Fresources%2Fsafe-cosmetics-tips%2F&utm_campaign=aga&utm_source=agsadl1%2Csh%2Ffx%2Fgs%2Fm2%2F4
- 18) Zulaikha Siti R., Khadijah Sharifa Nor S.I., Praveena S. M.; "Hazardous Ingredients in Cosmetics and Personal Care Products and Health Concern: Journal of Public Health Research (2015), 5(1): 7-15.
- 19) Wirtu Yohannes Desalegn, "A review of environmental and health effects of synthetic cosmetics", Front. Environ. Sci., 22 October 2024 Sec. Toxicology, Pollution and the Environment Vol.(12)(2024).
- 20) ScienceOpen [Internet]. Domina Petric, "Review of Toxic Chemicals in Cosmetics" c2021 [cited 2021 Oct 20]. Available from: <https://www.scienceopen.com/hosted-document?doi=10.14293/S2199-1006.1.SOR-PPKO7OD.v1>