

CONTROVERSIAL COSMETIC INGREDIENTS



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Introduction

Market for Cosmetic Products

Global personal care products industry would reach around \$630 billion by 2017. With the rapid increase in global access to information, more consumers are actively seeking information on the products that they consume which is true for the personal care sector (Underwriters Laboratories [UL], 2015).

Reports on Cosmetic Ingredient Toxicity

Center for Disease Control and Prevention showed that reproductive problems doubled between the year 1970 and 1993. Environmental chemicals are strongly suspected to be contributing factors. Several recent reports highlight the presence of low-level concentrations of potential reproductive or developmental toxicants, particularly phthalates, in cosmetics and personal care products (Barrett, 2005).

According to these three reports, makeup, shampoo, lotion, nail polish, and other cosmetic products contain chemical ingredients that lack safety data. Moreover, some of these chemicals have been linked in animal studies to male genital birth defects, decreased sperm counts, and altered pregnancies. Often, their presence is not noted on labels (Barrett, 2005).

Aggregate and Cumulative Exposure to Chemicals

A study conducted by the Campaign for Safe Cosmetics indicates that women use an average of 9 cosmetic products which exposes them to a mixture of over 100 individual chemicals. Risks associated with specific ingredients may be increased due to a person's use of multiple products daily over time (cumulative exposure) or through exposure to similar chemicals in a number of different products (aggregate) (UL, 2015).

Problems on Ensuring Cosmetic Product Safety

Poorly Enforced Regulations

Non-government organizations (NGOs) and the public have indicated low level of trust in the regulation of personal care products. The Cancer Prevention Coalition said that "cosmetics are the least regulated products under the Federal Food, Drug, and Cosmetic Act (FFDCA)." In 36 years, the US FDA has only rejected 11 ingredients as unsafe for use in cosmetics. The European Union on the other hand banned more than a thousand ingredients from use in cosmetics in 2003 (UL, 2015).

Inadequate Consumer Information and Data Availability

Data availability regarding the full list of ingredients of the cosmetic products are not disclosed to the public. This lack of disclosure coupled with incomplete public information or understanding of the existing safety assessment of these products, has resulted in increasing concerns (UL, 2015).

Government and Non-Government Initiatives

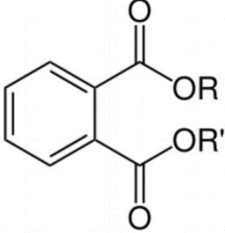
"Red Lists" of chemicals to be avoided as ingredients are integral to the regulations supporting cosmetic products. NGOs are also increasingly using red lists to identify priority ingredients.

- Environmental Defense Fund - "10 Ingredients to Avoid"

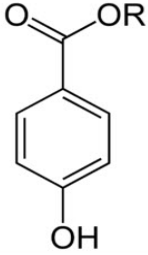
- Campaign for Safe Cosmetics - 20 “Chemicals of Concern”
- Women’s Voices for the Earth - 20 harmful chemicals found in feminine care products
- Environmental Law Centre in the UK - 9 chemicals to avoid in its “Toxic Tour of Toiletries”

Top Cosmetic Ingredients of Concern

1. Phthalates

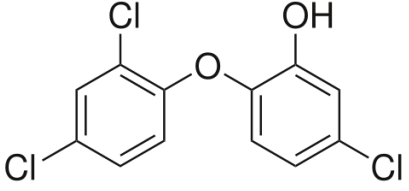
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| Structure |  |
| Related compounds | Dibutyl phthalate (DBP), diethyl phthalate (DEP), di-2-ethylhexylphthalate (DEHP) |
| Physicochemical properties | Clear syrupy liquid consistency; low water solubility, high oil solubility, and low volatility. |
| Functional category | Plasticizer |
| Products where it is found | Color cosmetics, fragranced lotions, body washes, hair products, nail polish |
| Health risks | Endocrine disruption, developmental and environmental toxicity, cancer |
| How to avoid | Choose options that do not contain DBP. Some nail product labels indicate they are “phthalate-free.” Products that list “fragrance” on the label should be avoided to prevent possible exposure to phthalates. |
| Regulations | DBP is a banned ingredient included on the List of Substances which “Must Not Form Part of the Composition of Cosmetic Products” (Annex II Part I Ref. No. 675) of the ASEAN Cosmetic Directive (ACD) |

2. Parabens

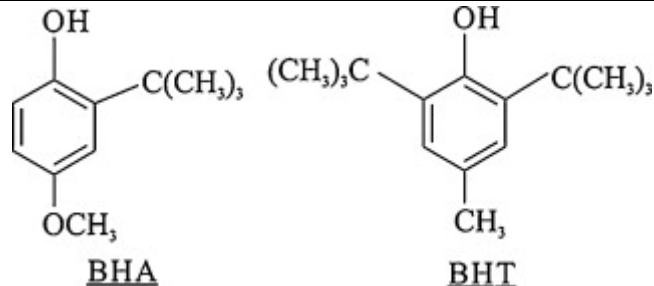
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| Structure |  |
| Related compounds | Methyl paraben, propyl paraben, butyl paraben, ethyl paraben |
| Physicochemical properties | White to off white crystalline structures, soluble in water |
| Functional category | Preservative |
| Products where it is found | Shampoos, conditioners, lotions, facial and shower cleansers, scrubs |

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| Health risks | Endocrine disruption Skin cancer - can lead to UV-induced damage of skin cells and disruption of cell proliferation Developmental and reproductive toxicity - Propyl and butyl parabens appear to reduce sperm production and lead to reduced testosterone levels |
| How to avoid | Look for products labeled “paraben-free” and read ingredient lists on labels to avoid products with parabens. Many natural and organic cosmetics manufacturers have found effective alternatives to parabens to prevent microbial growth in personal care products. Some companies have created preservative-free products that have shorter shelf lives than conventional products (six months to a year). |
| Regulations | FDA Philippines banned selected parabens as ingredients for cosmetic products: Isobutylparaben, Isopropylparaben, Benzylparaben, Pentylparaben, Phenylparaben. |

3. Triclosan

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| Structure |  |
| Related compounds | Triclosan (TSC) and triclocarban (TCC) |
| Physicochemical properties | White powdered solid with a slight aromatic, phenolic odor |
| Functional category | Bacteriostat, preservative |
| Products it is found | Antibacterial soaps and detergents, toothpaste and tooth whitening products, antiperspirants/deodorants, shaving products, creams, color cosmetics. |
| Health risks | Endocrine disruption - it impacts thyroid function and thyroid homeostasis, Triclosan resistant bacteria (Ex. E-coli and Salmonella), bioaccumulation toxicity, environmental toxicity |
| How to avoid | Avoid products that indicate triclosan and triclocarban on the label. Stick with plain soap and water—the FDA found no evidence that antibacterial washes containing triclosan are any more effective at protecting against bacteria |
| Regulations | Allowed by FDA Philippines in limited concentrations: 0.3 % for toothpaste, hand soaps, body soap/shower gel, face powders, blemish concealers and nail products, 0.2 % for mouthwash |

4. Butylated Compounds

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| Structure |  <p style="text-align: center;">BHA BHT</p> |
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| Related compounds | Butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT) |
| Physicochemical properties | BHA - white or yellowish waxy solid with faint characteristic aroma BHT - white powder |
| Functional category | Preservatives, antioxidants |
| Products it is found | Nail polish (prevent chipping and make it more flexible), lip products, hair products, makeup, sunscreen, antiperspirant/deodorant, fragrance, creams |
| Health risks | Reproductive toxin that could affect male reproductive development and has been linked with birth defects in animal studies. Can be absorbed in the bloodstream either through skin or inhalation. |
| How to avoid | Avoid products that indicate BHA or BHT in labels. Provide own nail polish when going to a salon or spa. Ensure that the salon or spa you visit is clean and well-ventilated |
| Regulations | BHA and BHT are regulated in food as additives (antioxidants). |

5. Ethanolamine Compounds

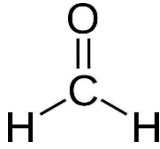
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| Structure | <p style="text-align: center;">Ethanolamines</p> |
| Related compounds | Methylethanolamine (MEA), diethanolamine (DEA), triethanolamine (TEA) |
| Physicochemical properties | Colorless, viscous liquid or solid with an unpleasant, ammonia-like odor |
| Functional category | Emulsifier, fragrance, pH adjuster |
| Products it is found | Soaps, shampoos, hair conditioners and dyes, lotions, shaving creams, paraffin and waxes, household cleaning products, pharmaceutical ointments, eyeliners, mascara, eye shadows, blush, make-up bases, foundations, fragrances, sunscreens |
| Health risks | Cancer, environmental concerns (bioaccumulation), organ system toxicity When ethanolamines are used in the same product as certain preservatives that break down into nitrogen, they can form nitrosamines (carcinogen) |
| How to avoid | Read the labels on cosmetics, personal care products and household cleaning products, and avoid those containing with words DEA, TEA and MEA. |
| Regulations | Philippine FDA established maximum value for ethanolamines in rinse-off products (1%) and other products (0.5%). |

6. Benzophenone Compounds

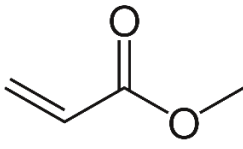
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| Structure | |
| Related compounds | Benzophenone-2 (BP2), oxybenzone, benzophenone-3 (BP3) |
| Physicochemical properties | White or off-white crystalline powder with rose-like odor |

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| Functional category | Fragrance enhancer, ultraviolet light absorber, stabilizer |
| Products it is found | Lip balm, nail polish, foundations, baby sunscreens, fragrance, shampoo, conditioner, hair spray, moisturizers, foundation |
| Health risks | Cancer, endocrine disruption, developmental and reproductive toxicity, organ system toxicity, irritation, ecotoxicity |
| How to avoid | Read labels and avoid products containing these chemicals. Choose sunscreens that rely on non-nanoized zinc oxide or titanium dioxide |
| Regulations | Philippine FDA established maximum allowable concentration of 10% for benzophenone and 3% for oxybenzone. Both substances are prohibited in aerosols/sprays and warnings on the label must be written when oxybenzone is in the product. |

7. Formaldehyde and Formaldehyde-Releasing Preservatives

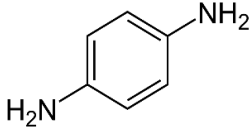
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| Structure |  |
| Related compounds | Paraformaldehyde, methanediol, DMDM hydantoin, diazolidinyl urea, imidazolidinyl urea, methenamine |
| Physicochemical properties | Colorless, water-soluble gas |
| Functional category | Preservative |
| Products it is found | Nail polish, nail treatment, eyelash glue |
| Health risks | Cancer, burning sensations in the eyes, nose, and throat, coughing, wheezing, nausea, and skin irritation |
| How to avoid | Use air conditioning and dehumidifiers, increase ventilation, wash permanent-press fabrics before use |
| Regulations | Formaldehyde is a restricted ingredient in cosmetics up to not more than 2.0% in Canada. In the Europe, formaldehyde-releasing preservatives must be identified on the product label with the notice, "contains formaldehyde" if the concentration of formaldehyde exceeds 0.05%. |

8. Acrylates

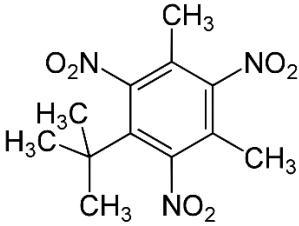
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| Structure |  |
| Related compounds | Ethyl acrylate, ethyl methacrylate, methyl methacrylate |
| Physicochemical properties | Colorless liquid with a characteristic acrid odor |
| Functional category | Adhesive, artificial nail builder, binder, film former; hair fixative; suspending agent |
| Products it is found | Hair dye, mascara, nail polish, lipstick, hairspray, body wash, sunscreen, anti-aging treatment |
| Health risks | Carcinogenic, dermal and nasal irritation |

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| How to avoid | Do not ingest or swallow. |
| Regulations | The permissible exposure limit is 10ppm. |

9. Coal Tar Dyes

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| Structure |  |
| Related compounds | Coal tar solution, tar, coal, estar, impervotar, KC 261, lavatar, picis carbonis, naphtha, benzin B70, petroleum benzin |
| Physicochemical properties | White or purple solid |
| Functional category | colorant |
| Products it is found | Colorants, hair dyes |
| Health risks | Carcinogenic, toxic to skin, aquatic toxicity, environmental toxicity |
| How to avoid | Check the ingredients listed on cosmetic and personal care products |
| Regulations | P-phenylenediamine is permitted only in hair dyes and must be accompanied by a warning that the product "contains ingredients that may cause skin irritation on certain individuals" and if used near the eyes "may cause blindness." |

10. Synthetic Fragrances

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| Structure |  Musk xylene |
| Related compounds | Aromatic compounds, Benzene derivatives, aldehydes, parfum |
| Physicochemical properties | Colorless to yellow liquid |
| Functional category | Fragrance |
| Products it is found | Moisturizers, cleansers, body washes, shampoos, conditioners, soaps, deodorants |
| Health risks | May include benzene derivatives (carcinogenic), other toxic chemicals linked to cancer, birth defects, neurotoxicity and allergic reactions, asthma, and migraine |
| How to avoid | Choose only "unscented" and "fragrance-free" product. Read labels carefully, as some products use other chemicals to mask scent to create the "unscented" experience. Avoid those products that list "synthetic fragrance" in the ingredient list. |
| Regulations | Canada is assessing one synthetic musk (moskene) and has flagged several others for future assessment. European Union restricts the use of many fragrance ingredients, including common musks (nitromusks) and requires |

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| | warning labels on products if they contain any of allergens commonly used as cosmetic fragrances. |
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11. Cosmetic Impurities

| Impurity | Health Risks | Ingredients Contaminated |
|----------------------------------|---|--|
| 1,4-dioxane | Carcinogenic, developmental and reproductive toxicity | PEG, SLES, detergents, foaming agents, emulsifiers, solvents |
| Ethylene oxide | Carcinogenic, neurotoxicity | PEG, SLS, polysorbate, laureth, steareth, |
| Nitrosamines | Carcinogenic, endocrine disruption, developmental and reproductive toxicity | Cocamidopropyl betaine, lecithin, sodium PCA, cocamide MEA, cocamide DEA |
| Polycyclic aromatic hydrocarbons | Carcinogenic, skin irritation, allergies | Petrolatum, mineral oil, paraffin |
| Heavy metals | Carcinogenic, developmental and reproductive toxicity | Hair dyes, colorants, makeup ingredients |

Solutions

Risk Assessment Frameworks

1. Cosmetic Ingredient Review (CIR)
Reviews literature and data for all cosmetic ingredients or group of chemically similar ingredients (as determined by internal chemists early in the process) to determine whether the ingredients are safe under their current use
2. Scientific Committee on Consumer Safety (SCCS)
Provides guidance for testing and evaluating the safety of cosmetic based upon a risk assessment process defined by the World Health Organization (WHO)
3. International Fragrance Association (IFRA)
Develops and publishes standards for the safe use of fragrance ingredients and materials in a wide variety of consumer products
4. Research Institute for Fragrance Materials (RIFM)
Develops standards for individual fragrance ingredients based on a risk assessment approach that incorporates current use levels, product type, and the potential for exposure when products are used as intended
5. Flavor and Extract Manufacturers Association (FEMA)
Develops and publishes safety data to support the self-affirmed Generally Recognized as Safe (GRAS) status of over 2,700 individual flavoring ingredients since 1970

6. International Council of Chemical Associations (ICCA)

Coordinates the work of member associations and their member companies through the exchange of information and the development of common positions on policy issues of international significance

Research into Viable Alternatives

Best practices were identified through a detailed expert review of the primary product safety risk assessment frameworks available for consumer products:

- All stakeholders agreed that alternatives assessment is an emerging area which requires more attention (Meiss, 2017).
- The retailer representative felt that the safety standards actually do a good job in addressing risk but that hazards have been insufficiently addressed.
- NGO representative felt that product development should start with identifying the least hazardous possible alternative ingredients, followed by risk assessment (UL, 2015).

Conclusions & Recommendations

There is a widespread presence of toxic chemicals in personal care products. Labeling requirements help the public to be aware of what's inside of their cosmetics. However, even conscious consumers have difficulty in avoiding particular ingredient of concern. This may be because of incomplete ingredient list and hard to find or expensive products with alternative ingredients (Gue, 2010).

The David Suzuki Foundation report cited recommendations to ensure the safety of consumers:

- Replace potentially harmful ingredients with safer alternatives
- Implement hazard labelling for ingredients linked to chronic health concerns
- Require pre-market approval of the chemical composition of cosmetics and allow public access to a searchable online database of information submitted by manufacturers
- Extend restrictions on cosmetic ingredients to “unintentional ingredients” (e.g., impurities, by-products)
- Prohibit anti-bacterial household products, including cosmetics
- Prohibit use of the terms unscented and fragrance-free in the marketing of products that contain fragrance ingredients (including masking agents)
- Restrict use of the terms natural and organic in the marketing of products that contain non-organic and synthetic ingredients

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