

A top-down view of various cosmetic products including a pump bottle, a jar of cream, a tube of lip balm, and a bar of soap, all surrounded by a variety of fresh flowers like daisies, purple bellflowers, and yellow wildflowers on a light pink background.

Cosmetic Safety & Formaldehyde

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What are cosmetics & how can they harm people?



Cosmetics: a type of product utilized to cleanse or change the appearance of the body.



They can contain chemicals harmful to human health & the environment.

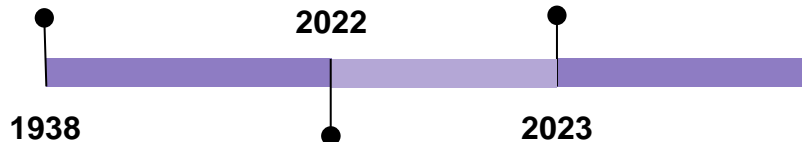
- Intentional
- Unintentional



The Food and Drug Administration (FDA) has limited capacity to monitor these products.

Cosmetic Safety Laws in the United States

Food, Drug, and Cosmetic Act (FDCA)



Modernization of Cosmetics Regulation Act (MOCRA)

Made necessary changes to the FDCA, which was enacted over 80 years ago.

Safer Beauty Bills Package

This package will implement additional necessary changes to MOCRA.

MOCRA & Ingredient Regulations



Coal Tar (Section 608)	Talc-Containing Cosmetics (Section 3505)	Per- and Polyfluoroalkyl Substances (PFAS) in Cosmetics (Section 3506)
<p>✗ Does not require coal tar ingredients to be deemed “safe”.</p> <ul style="list-style-type: none">■ Only a caution statement label is required.	<p>✓ Requires standardized testing for detecting asbestos in talc-containing products.</p>	<p>✗ States that PFAS safety risk must be studied in cosmetic products.</p> <ul style="list-style-type: none">■ The presence of PFAS in cosmetic products is already known to be harmful & should be banned at a federal level!

PFAS State Regulations

California, Maryland, & Washington

Banned PFAS & other hazardous chemicals in cosmetics (effective Jan 1, 2025)

Colorado

Banned PFAS in cosmetics (Jan 1, 2025)

Maine

Banned PFAS from all products (Jan 1, 2030).

* [Medical exceptions](#)

Minnesota


Banned PFAS in certain products, including cosmetics (Jan 1, 2025). Ban from all products → Jan 1, 2032.

* [Medical exceptions](#)

New York (Bill A.6969/S.4265)

If passed, would ban the sale of personal care products that contain intentionally added PFAS & other hazardous chemicals.

Coal tar in cosmetic products

- 
- Coal tar is formed from coal or petroleum.
 - Polycyclic aromatic hydrocarbons (PAHs) & benzo[a]pyrene → cancer
 - Pyridine → neurological damage
 - Coal tar is present in:
 - **Hair dyes**
 - Shampoos & scalp treatments
 - Lotions
 - Soaps

The EU banned 2,492 harmful ingredients from cosmetic products. The US regulates 11.



- The European Chemicals Agency (ECHA) requires 25 fragrance allergens to be labeled.
 - MOCRA will be in effect on December 29, 2023, & manufacturers will be required to label fragrance allergens.

The Safer Beauty Bills Package

- Cosmetic Supply Chain Transparency Act
- Toxic-Free Beauty Act
- Cosmetic Fragrance and Flavor Ingredient Right to Know Act
- Cosmetic Safety for Communities of Color and Professional Salon Workers Act



The Cosmetic Supply Chain Transparency Act

- This would require **upstream** suppliers to provide cosmetic companies with information upon request.
 - Toxicity & safety data
 - Certificate of analyses

Supply Chain

Raw materials → Supplier →
Factory → Distribution →
Retail → Customer



The Toxic-Free Beauty Act



- This would ban 11 hazardous chemicals from beauty & personal care products sold in the US.
 - Women of color & professional salon workers are at highest risk of exposure.

The 11 Hazardous Chemicals in the Toxic-Free Beauty Act

M-Phenylenediamine & O-Phenylenediamine

- Eye irritation, cancer, skin sensitization
- *Hair dyes, hair products*

Formaldehyde, Paraformaldehyde & Methylene Glycol

- Cancer, skin irritation, respiratory harm
- *Hair straightening products*

Quaternium-15

- Cancer, skin irritation, respiratory harm
- *Body wash, baby shampoo, hair products, makeup*

Isobutylparaben & Isopropylparaben

- Endocrine disruption, breast cancer, reproductive harm
- *Sunscreen, lotion, blush, hair products, eye liner*

Dibutyl Phthalate (DBP) & Diethylhexyl Phthalate (DEHP)

- Birth defects, breast cancer, endocrine disruption
- *Nail polish, fragrance*

Mercury

- Neurotoxicity, reproductive toxicity, kidney damage, mercury poisoning
- *Skin lightening creams, germicidal soaps, lotions*



The Cosmetic Fragrance & Flavor Ingredient Right to Know Act

The goal is to require companies to provide the names of all ingredients used to make fragrances & flavors by listing them on product labels & company websites.



The Consequences of Aggressive Marketing in the Cosmetic Industry

- Cosmetics can contain harmful chemicals linked to breast & ovarian cancer, reproductive harm, & more.
 - Hair dyes, hair relaxers & straighteners, feminine douches, deodorant, etc.
- Black women purchase more beauty products per capita than any other demographic.
 - Highest breast cancer mortality rate in the US.

Cosmetic Safety for Communities of Color & Professional Salon Workers Act

- Aims to mandate access to translated safety data sheets.
- The Act would provide funding for:
 - Identifying harmful chemicals
 - Understanding health impacts
 - Green chemistry & safer alternatives
 - The creation of 2 national resource centers:
 - Beauty Justice & Health
 - Safety for Professional Salon Workers

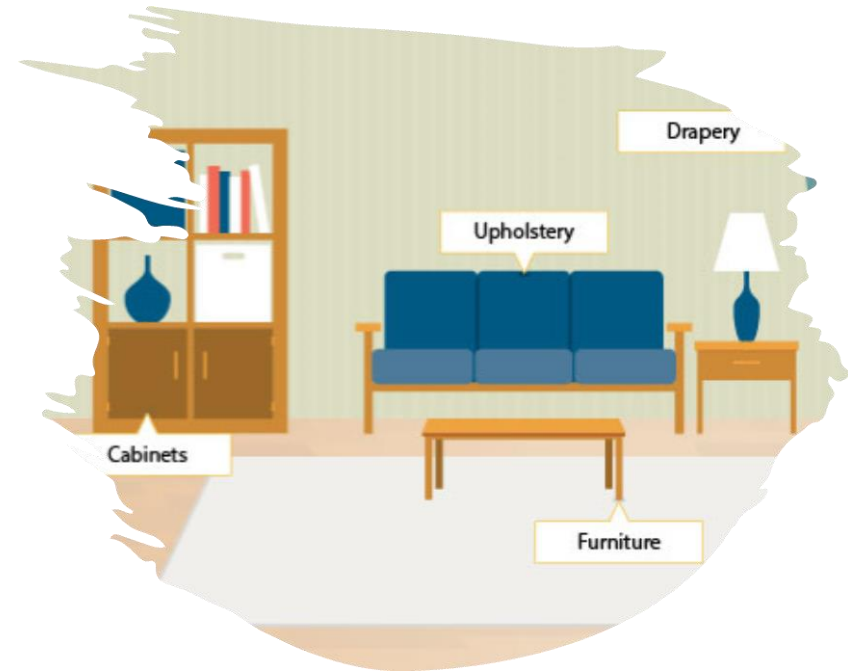




Formaldehyde

What is Formaldehyde?

- Formaldehyde- a compound that occurs naturally in the environment.
 - Metabolic processes in plants/animals/humans, & food.
- Used in wood products, textiles, plastics, & cosmetics. It is an antimicrobial agent.
- Released from combustion processes & tobacco smoke.



How are people exposed?

Exposure:

- Inhalation
- Skin/eye contact
- Ingestion

Absorption:

- Lungs
- Skin
- GI tract

Children are more vulnerable than adults because of a smaller diameter of the airways & the following ratios:

Greater lung surface area: body weight

Increased minute volumes: weight

Larger skin surface area: weight



Formaldehyde Releasing Preservatives in Cosmetics

- Formaldehyde functions as a preservative, preventing bacterial growth.
 - Quaternium-15
 - Most sensitizing
 - DMDM hydantoin
 - Least sensitizing
 - Diazolidinyl urea
 - Releases the most formaldehyde
 - Imidazolidinyl urea
- Formaldehyde releasing preservatives (FRPs) are in chemical straighteners, hair relaxers, nail polish, body wash, shampoo, makeup, & lotion.

FRPs & Corresponding Products

Quaternium-15

Blush, mascara, lotion, & shampoo

DMDM Hydantoin

Lotion, sunscreen, & make-up remover

Diazolidinyl urea & Imidazolidinyl urea

Shampoo, conditioner, blush, eye shadow, & lotion





Formaldehyde is a Volatile Organic Compound (VOC)

- VOCs- emitted as gases from solids/liquids.
 - Composed of a variety of chemicals that result in short & long term health effects:
 - Eye/nose/throat irritation, liver/kidney/CNS damage, headaches, cancer
- Products applied to the face → greater amounts of inhaled VOCs.
- The order on ingredient list corresponds to VOC emission level.

Respiratory Effects



- Formaldehyde can result in acute lung injury.
 - Characterized by irritation, epithelial cell death, & airway edema.
- It impacts the upper airways as the vapor/gas dissolves readily in the mucus & concentrate.

Formaldehyde is a known Human Carcinogen

- Formaldehyde is a genotoxic carcinogen:
 - Damages DNA, resulting in mutation.
 - Initiates tumors.
 - Tumorigenicity increases with increased exposure in a linear manner.
 - There is no threshold.
- Leukemia
- Cancer of the nasopharynx





Reproductive & Developmental Effects

- Human Studies
 - Irregular/abnormal menstruation
 - Some evidence of association with miscarriages
 - + Association with ovarian cancer
- Animal Studies
 - Male rats
 - Inhalation- damaged reproductive tissues & ↓ testosterone levels
 - Oral- sperm head abnormalities
 - Pregnant rats
 - Inhalation- ↓ in placenta size, ↑ in fetal abnormalities
 - Mice
 - Male- inhalation: ↓ sperm count & ↓ sperm survival rate
 - Female- inhalation: incomplete development of the uterus & ovaries

Formaldehyde Health Impacts Summary

- Acute effects
 - Skin sensitization
 - Eye/nose/throat irritation
 - Headache
 - Lung injury
- Chronic effects
 - Cancer (nasopharynx, leukemia, ovarian)
 - Liver/kidney/CNS damage
 - Irregular/abnormal menstruation
 - (potentially) Miscarriages
 - Incomplete development of the uterus & ovaries
 - ↓ Spermatogenesis



Formaldehyde in Personal Care Products Study



- 1) Create & administer a survey
- 2) Test products for formaldehyde & FRPs
- 3) Analyze data & use it to improve cosmetic safety

Personal Care Products Survey

- Modeled a survey from the *Taking Stock Study* in California.
 - Aimed to document personal care product use among different races & ethnicities.
- Our survey consists of the following categories:
 - Leave-on personal care products
 - Hair products
 - Rinse-off personal care products
 - Makeup & nail products
 - Menstrual/Intimate products



Survey: Identifying Product Use

<i>Rinse-off Personal Care Products</i>	<i>2 or more times per day</i>	<i>1x per day</i>	<i>A few times a week</i>	<i>1x per week</i>	<i>Every 1-3 months</i>	<i>1-3x per year</i>	<i>Never</i>	Safety Concern
Toothpaste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hand soap	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Body soap or shower gel WITH fragrance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Body soap or shower gel, fragrance-free	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Facial soap, cleanser, or face wipes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Body scrub	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mouthwash	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Peel-off or sheet masks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Makeup remover	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bath bomb or bubble bath	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If you can recall, list the brand names of your rinse-off personal care products:								

Survey: Understanding Consumer Choices

[illegible][illegible]

Check for Cosmetic Safety using Clearya

- Helps you find safer alternatives.
- Scan product labels or use Clearya online at:

amazon **SEPHORA**

Walmart 

iHerb



Key Takeaways

- Cosmetics that contain harmful ingredients can be sold in the US due to a lack of regulation.
- Formaldehyde can be found in cosmetic products, resulting in potential adverse health effects.
- Current research efforts & the Safer Beauty Bills Package could improve cosmetic safety.



Discussion

1. What are your thoughts on cosmetic safety? Did they change throughout this presentation?
2. What is something that stuck out to you?
3. Will you change any of your consumer habits regarding cosmetics? Why or why not?
4. Is there anything you are still curious about & would like to learn more about?



Sources

https://www.bcpp.org/wp-content/uploads/2023/01/Cosmetic-Safety-Law-Reform_CSC-Section-by-Section-Analysis-1_10_23.pdf

<https://www.bcpp.org/resource/safer-beauty-bill-package/>

<https://www.bcpp.org/wp-content/uploads/2023/05/2023-Federal-Supply-Chain-Transparency-bill-fact-sheet.pdf>

<https://www.bcpp.org/wp-content/uploads/2023/05/2023-Toxic-Free-Beauty-Act-Fact-Sheet.pdf>

<https://www.bcpp.org/wp-content/uploads/2023/05/2023-Federal-Cosmetic-Fragrance-and-Flavor-Ingredient-Right-to-Know-Act-Fact-Sheet.pdf>

Re, Diane. (2023). Respiratory Toxicology and Air Pollution. Fundamentals of Toxicology, Lecture Content. Columbia University Mailman School of Public Health, New York.

Re, Diane. (2023). Molecular and Cellular Events/Carcinogenesis. Fundamentals of Toxicology, Lecture Content. Columbia University Mailman School of Public Health, New York.

https://ec.europa.eu/health/scientific_committees/opinions_layman/perfume-allergies/en/l-3/1-introduction.htm

<https://www.fda.gov/cosmetics/cosmetics-laws-regulations/prohibited-restricted-ingredients-cosmetics>

https://www.weact.org/wp-content/uploads/2019/01/5.-Paromita_Hore_NYCDOHMH_Skin_Lightening_Cream.pdf

Sources

<https://www.bcphp.org/wp-content/uploads/2023/06/2023-Cosmetic-Safety-for-Communities-of-Color-and-Professional-Salon-W.pdf>

<https://apps.ecology.wa.gov/publications/documents/2304007.pdf>

<https://www.nrdc.org/bio/kate-donovan/ny-bills-ban-harmful-pfas-chemicals-protect-our-health>

<https://wwwn.cdc.gov/TSP/MMG/MMGDetails.aspx?mmgid=216&toxid=39#:~:text=Most%20formaldehyde%20exposures%20occur%20by,to%20a%20lesser%20extent%2C%20skin.>

<https://www.safecosmetics.org/chemicals/formaldehyde/>

<https://www.cancer.org/cancer/risk-prevention/chemicals/formaldehyde.html>

<https://www.fda.gov/cosmetics/cosmetic-products/hair-dyes>

https://echa.europa.eu/cosmetics-prohibited-substances?p_p_id=eucleflegislationlist_WAR_euclefportlet&p_p_lifecycle=1&p_p_state=normal&p_p_mode=view&_eucleflegislationlist_WAR_euclefportlet_javax.portlet.action=searchLegislationLists

Sources

<https://lawfilesexternal.leg.wa.gov/biennium/2023-24/Pdf/Bills/House%20Passed%20Legislature/1047-S.PL.pdf?q=20230626172421>

<https://www.nysenate.gov/legislation/bills/2023/A6969>

<https://leg.colorado.gov/bills/hb22-1345>

https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200AB2762

https://mgaleg.maryland.gov/2021RS/Chapters_noln/CH_490_hb0643t.pdf

<https://www.epa.gov/indoor-air-quality-iaq/volatile-organic-compounds-impact-indoor-air-quality>

<https://doi.org/10.1111/ina.12948>

<http://dx.doi.org/10.1016/j.yrtph.2012.02.011>

<https://doi.org/10.1080/15459624.2011.626259>

<http://dx.doi.org/10.1016/j.mrrev.2011.07.003>

<http://dx.doi.org/10.1136/oemed-2023-108948>

Sources

<https://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1976L0768:20100301:en:PDF>

<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM:l21191#AMENDINGACT>

<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32009R1223>

<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022R1531>

<https://www.cancer.org/cancer/risk-prevention/chemicals/formaldehyde.html>

file:///C:/Users/alici/Downloads/The_European_Union_Cosmetics_Directive_Explanatory_Brochure_2004.pdf

<https://wwwn.cdc.gov/TSP/MMG/MMGDetails.aspx?mmgid=216&toxid=39#:~:text=Most%20formaldehyde%20exposures%20occur%20by,to%20a%20lesser%20extent%2C%20skin.>

<https://www.clearya.com/>