
Environmental Issues

EPA recognizes the importance of choosing greener products and is working to increase public access to chemical information. In 2011, EPA launched the “Greener Products” website to help consumers understand what products are less damaging to human health and the environment when compared with competing products and services.



This website and the companion guide support EPA's commitment to ensuring greater transparency in the ingredients in products and to increase public access to chemical information.

In 2008, the Environmental Finance Center (EFC9) received a grant from EPA Region 9 to examine the use of toxic chemicals in African-American hair salons in California. Working with salons and cosmetology schools throughout the state, EFC9 identified chemicals in hair care products that may adversely affect human health and the environment. For example, they identified hormone-containing hair products linked to early puberty in children and higher rates of several different types of cancer in hair salon workers.

An African American Hair Salon Roundtable was convened to discuss the practice, science, regulation and business of the ethnic beauty industry and how EPA could help address the health and environmental impacts of toxic chemicals in hair products. The EFC9 project led to these resources on potential health effects and healthier hair care practices.

Every day many of us use personal care products that contain potentially harmful ingredients. Think about how many personal care products you use in a single day, a year and over your lifetime. Small amounts of toxic chemicals add up and can accumulate in our bodies.

Of the 10,500 chemical ingredients used in the personal care products, just 11% have been assessed for health and safety. Hundreds of chemicals – some safe and some known to be hazardous – are present in our personal care products. Because countless new compounds are developed each year, it's hard for consumers to know about them all. The good news is that there are some easy and affordable alternatives available to every consumer.

Many companies are now making less toxic products and are striving to introduce nontoxic products. Nonprofit organizations such as the Campaign for Safe Cosmetics encourage the cosmetics industry to pay attention to consumer demands for safer products.



Chemical Exposure

Cosmetology is a predominantly female occupation; more than half a million women in the United States are employed as cosmetologists (Bureau of Labor Statistics), using their skills to apply beauty treatments. Cosmetologists typically provide pedicures, manicures, facials, and other beauty treatments. Cosmetology has many specialties, including hairdressers and nail technicians. More than one million individuals are licensed as cosmetologists in the United States, the majority being women, and several million individuals practice as hairdressers and barbers worldwide (World Health Organization, International Agency for Research on Cancer [IARC]). The number of registered manicurists has increased by 345% in the United States, to more than 393,000, since 1991, and the 10-year employment growth projection for nail technicians is 28%. Hairdressers and nail technicians are predominantly female, and many are of reproductive age. As these workers often start their careers before the age of 20, it is assumed that many begin working before considering family planning. This assumption raises concerns because these women of reproductive age are at higher risk for the effects of exposure to potential reproductive toxins.

Hairdressers use a wide range of products, including shampoos, hair dyes, hair sprays, straighteners, and bleaches. Hair dyes represent the largest segment of chemical products in the hair market today. As such, they are the main source of chemical exposure among hairdressers. The process of

dyeing human hair can be traced back at least 4,000 years. Evidence from Egyptian tombs indicates the use of henna for dyeing hair, nails, and skin (World Health Organization, 1993). These products may play a positive role in improving quality of life, due to the human desire to improve appearance; individuals' frequent contact with these products requires the ingredients be safe. Approximately 35% to 40% of women living in the United States use hair dyes, applied personally or by a hairdresser.

Among nail technicians, nail polish is the product most often used and the main potential source of chemical exposure for them. Common nail polish ingredients include toluene, plasticizers (i.e., dibutyl phthalate), and formaldehyde (U.S. Food and Drug Administration [FDA], 2013). Toluene is a widely used industrial solvent. Toluene inhalation ("sniffing" of paint reducer or paint thinner) during pregnancy has led to neonatal effects, including intrauterine growth retardation, premature delivery, congenital malformations, and postnatal developmental retardation. Dibutyl phthalate, which keeps polish from becoming brittle and chipping, has been linked to reproductive issues in humans if the mother is exposed while pregnant and has been banned for use by the European Union. Nail technicians handle fewer chemicals than hairdressers, but they frequently share a workspace with hairdressers and sometimes perform some of the same tasks. The shared space and dual roles increase occupational exposures for both groups.

More than 9,000 chemicals are found in cosmetic products. Hair dyes are classified as permanent, semi-permanent, and temporary, each having its own chemical formulation. For nail polish, a typical nail treatment in a salon takes 1 hour or more and includes application of a base coat of nail polish, two coats of the colored nail polish, and then a top coat (World Health Organization, 1993).. Both occupations require long shifts during which hairdressers and nail technicians offer a variety of services.

Hairdressing has been reported to be associated with a variety of health issues, including dermatitis, cancer, and respiratory problems. In a meta-analysis of 42 studies, a statistically significant increased risk for bladder cancer was found among hairdressers, specifically those who had held the job for more than 10 years. Alternatively, a review conducted by concluded that evidence suggests that occupational exposure to hair dyes poses no carcinogenic or other human health risk. However, this review focused on acute toxicity and health effects of hair dyes, not on the potential long-term

reproductive effects of exposure. The evidence related to the harmful effects of hair dyes and nail polish on reproductive health is limited.

In a study comparing female hairdressers to female office worker and shop assistant controls ($n = 310$), an increased risk for subfertility and menstrual disorders was found among the hairdressers. However, further research is needed to clarify which occupational exposure explains this association.

Another study, involving self-reported reproductive health of women in Norway, found a significant increase in infertility and spontaneous abortions among hairdressers compared to women in other occupations. Outside organizations reported similar findings, observing associations among spontaneous abortion, the number of hours worked per day, and the number of chemical services performed per week. That study focused on assessing whether working in cosmetology during the first trimester of pregnancy was associated with an increased risk of spontaneous abortion. Part-time work as a cosmetologist was not associated with increased spontaneous abortion risk, and no associations were found for cosmetologists who worked less than 35 hours per week and provided few chemical services. However, this study was based on a mail survey. Mail surveys are subject to non-response bias, which occurs if the answers of respondents differ from potential answers of non-respondents.

One study found that hairdressers and the general population exhibited similar rates of infertility. This did not support the hypothesis that hairdressers are at increased risk of infertility. However, a potential source of bias in this study related to care-seeking behavior. For instance, for a variety of reasons, some women may have less access to health care or be more likely to avoid seeking care; this bias could have led to an inaccurate finding in this study.

Another study found an increased risk of prolonged “time-to-pregnancy” of more than 12 months for hairdressers. An historical cohort study was conducted in the Netherlands examining two time periods, conceptions in 1986 to 1988 and 1991 to 1993, as exposure to reproductive toxic agents in hair salons could have changed during this time. These periods were chosen based on the enactment of bans on the use of dichloromethane and several dye formulations in 1990 in the United States and several European countries. The results demonstrated an increased risk of spontaneous abortions for those hairdressers who conceived in 1986 to 1988. For the hairdressers who conceived in 1991 to 1993, no increased risk of spontaneous abortions was found. The results indicated increased

reproductive risk for hairdressers in earlier years that appeared to decrease over time. These result, who found an increased risk of spontaneous abortions among cosmetologists, using pregnancy data from 1983 to 1988; however, they found increased risks only among those who worked more than 35 hours per week.

Evaluated reproductive disorders due to chemical exposure among hairdressers to determine risk and identify the activities and agents most likely to cause such effects. They found inconsistent results from epidemiologic studies and limited human data on the reproductive risks of chemicals and chemical amounts used in salons, leading to few data-driven conclusions found prolonged “time-to-pregnancy” among hairdressers. However, this finding could have potentially been confounded by stressful work situations, as chemicals handled by hairdressers were not strongly supported or controlled in the study. Miscarriage risk was not higher for hairdressers compared to referents, and risks were not statistically significantly increased for most hair treatment. The study results were consistent with those of a previous study involving hairdressers in which an increased risk for subfertility was found.

Products Labeled as Natural/Organic

The word “natural” on a product label doesn’t always mean it’s safe or natural. Many products are being marketed as natural and/or organic but have chemical ingredients that raise health concerns. Reviewing the ingredients on the label is one way to be sure the product is true to its claims. Be aware that potentially problematic chemical ingredients can hide behind the word “fragrances.” Fragrances are considered trade secrets and the ingredients within fragrances are not required by law to be revealed and may represent many ingredients, sometimes hundreds. “Unscented” and “fragrance free” have no legal definition, these words can be used in a variety of ways. “Unscented” or “fragrance free” labels do not guarantee that the product doesn’t contain potentially toxic chemicals. Before purchasing consumer products you may want to seek out consumer information resources such as the [Environmental Working Group’s Skin Deep Safety Database](#) EXITÉPA or [Goodguide](#) EXITÉPA to research products to find the safest alternatives.

Ingredient	Product	Potential Health Effects
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<p>¹Lead**</p>	<p>Hair Dye¹</p>	<p>Lead has been associated with harmful impacts to virtually every organ system in the body. Elevated exposures are associated with severe central nervous system impacts and potentially irreversible neurodevelopment delays and behavioral changes in children. Elevated exposure levels have also been associated with increased rates of miscarriage and reproductive toxicity.</p>
<p>²Paraphenylenediamine** Other names: Para-Phenylenediamine; PPD; P-Phenylenediamine; 1, 4 diaminobenzene; 1, 4 phenylenediamine; P-Aminoaniline</p>	<p>Hair Dye</p>	<p>Exposure could cause mild dermatitis in contact location including redness, pain, and swelling, and when in contact with the eyes could possibly cause swelling of the eyelids, blurred vision and possible permanent loss of vision. Inhalation of this chemical may be associated with cough, headache, dizziness and labored breathing. Possible severe reactions to PPD are urticaria and, rarely, anaphylaxis.</p>
<p>³Sodium Hydroxide** Looks like this on a label: Lye; Caustic Soda; Sodium Hydrate</p>	<p>Relaxer, Permanent, Hair Wave</p>	<p>Overexposure is corrosive to all tissues and mucous membranes such as in the eyes, nose, and throat. Concentrated exposures frequently result in extreme and severe irritation, edema (swelling) and acute dermal reactions. Direct contact with sodium hydroxide can result in constrictive scarring, and inhalation results in acute damage to the pulmonary system.</p>
<p>¹Formaldehyde*** Looks like this on a label: Formalin; formic aldehyde; oxomethane; oxomethylene</p>	<p>Shampoo and Bleach</p>	<p>Elevated exposures have been associated with irritation and edema to the pulmonary system and mucous membranes. Overexposure also irritates the eyes, nose and skin, and repeated exposures have been associated with a hypersensitivity (allergic) responses in some individuals. The compound demonstrates carcinogenic activity.</p>
<p>¹Dibutyl Phthalates* Looks like this on a label: DBP; Di-n-butyl phthalate; dibutyl 1,2-benzene dicarboxylate</p>	<p>Fragrance for shampoo and moisturizers</p>	<p>Overexposure has resulted in gastrointestinal distress in humans. The compound has caused birth, reproductive and developmental impacts in animals. Some phthalate compounds have carcinogenic activity in animals.</p>
<p>⁴Hydantoin DMDM*** Looks like this on a label: 1-3-Bis (Hydroxymethyl)-5,5- imethylimidazolidine-2,4- Dione; 1,3-Dimethylol-5,5-Dimethyl</p>	<p>Children's conditioner and detangler</p>	<p>Overexposure has resulted in irritation and edema in sensitized individuals. Irreversible damage to the eye has been reported due to its caustic nature. Considered harmful to human health because of toxic impact on developmental and reproductive</p>

Hydantoin; Glydant; Gidol; Glycolylurea	Dantogard;		systems. This compound is an antimicrobial formaldehyde releasing agent.
Colorants/Synthetic Colors *** Looks like this on a label: D&C; FD&C; azo grenadine; disodium 5-amino-4-hydroxy-3-(phenylazo)-naphthalene-2,7-disulfonate; Acid Red 33; Red 33; Naphthalene Red		Makeup and hair products to create color; some are derived from coal tar.	Some specific dyes and color compounds have been associated with carcinogenic activity at extremely elevated concentrations. Some of these compounds have also been associated with edema and irritation in hypersensitive individuals.
DEA/MEA/TEA *** Looks like this on a label: Diethanolamine; monoethanolamine; ethanolamine; triethanolamine; Lauramide DEA		Shampoos and products that foam	Elevated exposures have been associated with irritation to the eyes, skin, nose and throat. These compounds have been associated with limited edema and irritation to the pulmonary system in some individuals.
¹Hydroquinone* Looks like this on a label: 4-Dihydroxybenzene; P-Dioxybenzene; 4-Hydroxyphenol; P-Hydroxyphenol; 1,4 Benzendiol		Hair bleaches and skin lighteners	Elevated exposures are associated with tinnitus (ringing in the ears), nausea, shortness of breath, cyanosis and convulsions. Edema and irritation to skin, eyes, nose, mucous membranes and intestinal tract have also been reported.
^{1,3}Propylene Glycol *** Looks like this on a label: Propylene Glycol; 1-2-Propanediol		Styling gels/lotions, conditioners, shampoos, hair dyes ³	Elevated or frequent exposure to propylene glycol is associated with dermal irritation and limited edema of the mucous membranes. Under repeated exposure conditions it is irritating to the eyes, nose and mouth. The Food and Drug Administration (FDA) has classified propylene glycol as an additive that is generally recognized as safe for use in food.

One way to avoid potential health effects from chemical ingredients in products is to use common natural ingredients such as shea butter and olive oil to make natural alternatives. If you make your own products, take extra precaution if you are allergic to ingredients such as avocados or nuts. Natural

recipes tend to have a shorter shelf life since they do not contain preservatives, so to prolong their use you can store them in your refrigerator.

There are many natural healthy hair ingredients including:

Shea Butter comes from a tree native to Africa which has soothing, moisturizing and protecting effects. It is also known as *Butyrospermum Parkii*. It displays a protective role against UV rays because of its cinnamic acid content. Shea Butter returns luster to skin and hair, and also protects the skin and scalp, especially in over-processed and/or heat treated hair.



Chamomile is a member of the daisy family and is an herb that purifies, calms and soothes with virtually no adverse effects so it can be used for long periods of time. The active ingredients in chamomile are called essential oils and flavonoids and are good for healing skin and scalp irritations.

Sunflower Oil has high amounts of Vitamins A, B, D and E, minerals, lecithin, insulin, and unsaturated fatty acids and is an excellent moisturizer because of its emollients. Emollients are known to soften skin and hair without leaving an oily residue.



Avocado Oil is a rich heavy oil, more penetrating than most oils. It is therefore good for dry hair and skin. The oil is obtained from the pulp of the avocado pear and has a deep green color. It is a stable, natural oil, rich in vitamin E. Avocado also contains Vitamins A, B1, B2, D, and Beta carotene. It is classified as monosaturated oil and is best suited for dry hair and skin.

Witch Hazel is extracted from the bark and leaves of the Hamamelis tree and is an astringent and gentle cleanser which removes build-up on the hair as well as the scalp; it also helps to fight dandruff.

Olive Oil is obtained directly from the olive after it has been harvested. It is made into a paste from which the oil is collected. Olive oil conditions and improves the strength and elasticity of the hair, helping to prevent breakage. It's also very good for "frizzy" and/or damaged hair.



Honey naturally attracts and holds moisture. It is also a natural antiseptic and contains antioxidants. Honey is packed with vitamins and minerals such as magnesium, potassium, calcium, sulphur, iron, zinc and vitamins B1, B2, B3, which aid in hair growth. It can be added to conditioners, rinses and pomades.

Known as the true or medicinal aloe, **Aloe Vera** is a species of succulent plants now widely used as a moisturizer and can also be used as a gel to re-twist locked hair. Aloe Vera is also used for soothing the skin, and keeping the skin moist while eliminating the risk of flaky scalp in harsh and dry weather.



Salons are going green and it makes good sense. The average salon uses a range of chemicals and consumes important resources such as water and energy. There are a number of things to look for when selecting a salon that is environmentally conscious. If your salon is new to "green" practices you can encourage them to adopt healthier practices that can reduce costs and their environmental footprint. Enjoy the added benefits of knowing that your choices will not harm your body or the environment. These practices can make your salon experience a healthier, safer, happier one.

Does your salon do any of the following?

Reduce

Limit Chemical Exposure

- Use less toxic, safer, natural products
- Use pumps instead of aerosol containers
- Use products with low volatile organic compound content
- Use non-toxic products for disinfecting and cleaning

Conserve Water

- Have a low-flow plumbing system
- Reduce hot water usage, use warm or cool temperatures when possible
- Turn off water when not in use
- [More information on ways to save water »](#)

Minimize Waste

- Use refillable containers for products
- Use a dispensing system for shampoo and conditioners
- Use products with packaging that uses less plastic and cardboard
- Offer water in reusable cups or glasses, instead of plastic water bottle
- [More information on ways to minimize waste »](#)

Conserve Energy

- Use energy-efficient lights throughout the salon
- Use [Energy Star](#) equipment

Reuse

- Give used magazines to other organizations, friends and customers
- Make empty containers and cardboard available to other businesses
- Require suppliers to take back empty refillable containers

Recycle

- Install recycling bins for office paper, cardboard, plastic, magazines



Information in this section of the course was obtained from the following sources and agencies:

- *Environmental Protection Agency*
- *Food and Drug Administration*
- *National Center for Biological Information*
- *Occupational Safety and Health Administration*
- *World Health Organization*