Not So Sexy

The Health Risks of Secret Chemicals in Fragrance

The Campaign for Safe Cosmetics
www.SafeCosmetics.org

Environmental Working Group

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Not So Sexy: The Health Risks of Secret Chemicals in Fragrance

by
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The Campaign for Safe Cosmetics would like to thank the following people for their review of sections of this report: Janet Gray, PhD, Vassar College; Russ Hauser, MD, ScD, MPH, Frederick Lee Hisaw Professor of Reproductive Physiology, Professor of Environmental and Occupational Epidemiology, Harvard School of Public Health and Professor of Obstetrics, Gynecology and Reproductive Biology Harvard Medical School; Ted Schettler, MD, MPH, Science and Environmental Health Network; and Anne C. Steinemann, PhD, Professor of Civil and Environmental Engineering, Professor of Public Affairs, University of Washington.

Any errors or omissions in this report are the responsibility of the Campaign for Safe Cosmetics.

Support for this project was provided by The As You Sow Foundation, The Jacob and Hilda Blaustein Fund, Johnson Family Foundation and The Richard and Rhoda Goldman Fund. Canadian product testing funding provided by Environmental Defence Canada.

About the Campaign for Safe Cosmetics

The Campaign for Safe Cosmetics is a national coalition of nonprofit women's, environmental, public health, faith and worker safety organizations. Our mission is to protect the health of consumers and workers by securing the corporate, regulatory and legislative reforms necessary to eliminate dangerous chemicals from cosmetics and personal care products.

Coalition members include the Alliance for a Healthy Tomorrow (represented by Clean Water Action and Massachusetts Breast Cancer Coalition), the Breast Cancer Fund, Commonweal, Environmental Working Group, Friends of the Earth and Women's Voices for the Earth.

The Breast Cancer Fund, a national 501(c)(3) organization focused on preventing breast cancer by identifying and eliminating the environmental links to the disease, serves as the national coordinator for the Campaign.

About the Environmental Working Group

Environmental Working Group (EWG) is a nonprofit research and advocacy organization based in Washington DC and founded in 1993. Our mission is to use the power of public information to protect public health and the environment. EWG specializes in providing useful resources (like Skin Deep and the Shoppers' Guide to Pesticides in Produce) to consumers while simultaneously pushing for national policy change.

Visit www.SafeCosmetics.org and www.CosmeticsDatabase.com for more information.

Executive Summary

A rose may be a rose. But that rose-like fragrance in your perfume may be something else entirely, concocted from any number of the fragrance industry's 3,100 stock chemical ingredients, the blend of which is almost always kept hidden from the consumer.

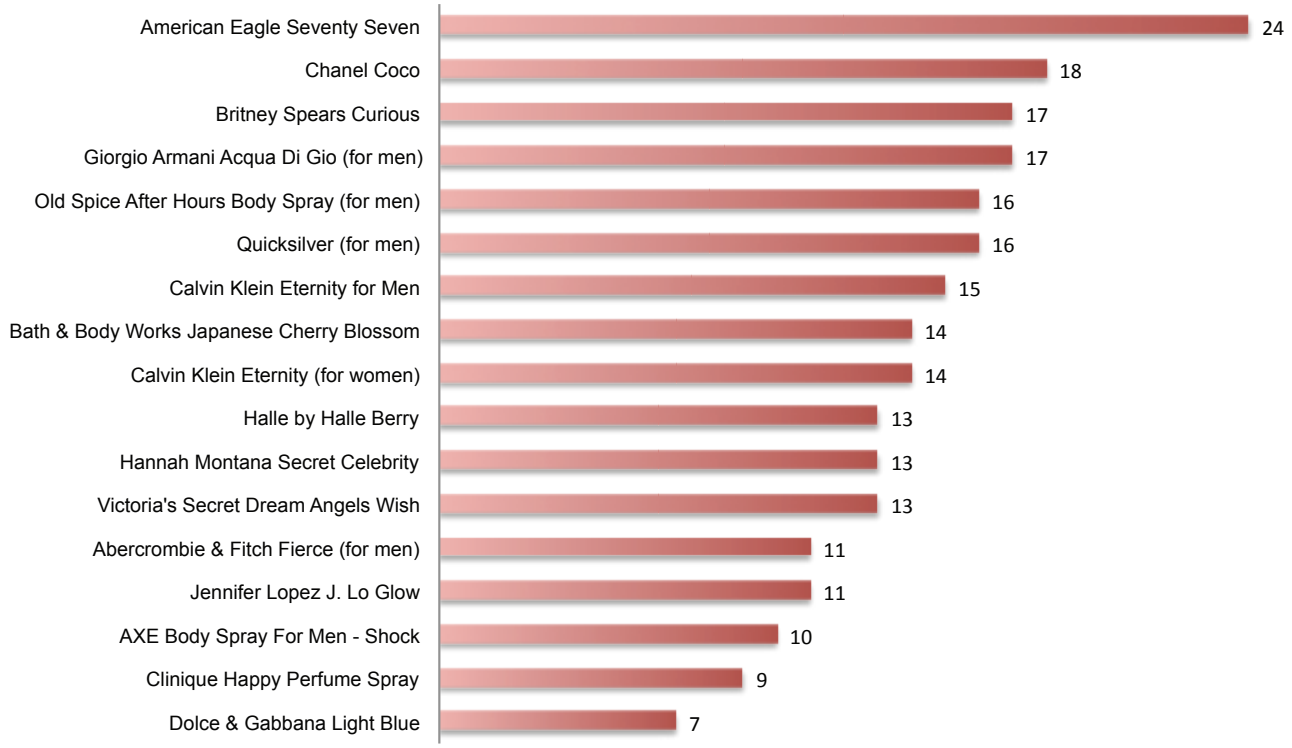
Makers of popular perfumes, colognes and body sprays market their scents with terms like "floral," "exotic" or "musky," but they don't disclose that many scents are actually a complex cocktail of natural essences and synthetic chemicals – often petrochemicals. Laboratory tests commissioned by the Campaign for Safe Cosmetics and analyzed by Environmental Working Group revealed 38 secret chemicals in 17 name-brand fragrance products, topped by American Eagle Seventy Seven with 24, Chanel Coco with 18, and Britney Spears Curious and Giorgio Armani Acqua Di Gio with 17.

The average fragrance product tested contained 14 secret chemicals not listed on the label. Among them are chemicals associated with hormone disruption and allergic reactions, and many substances that have not been assessed for safety in personal care products.

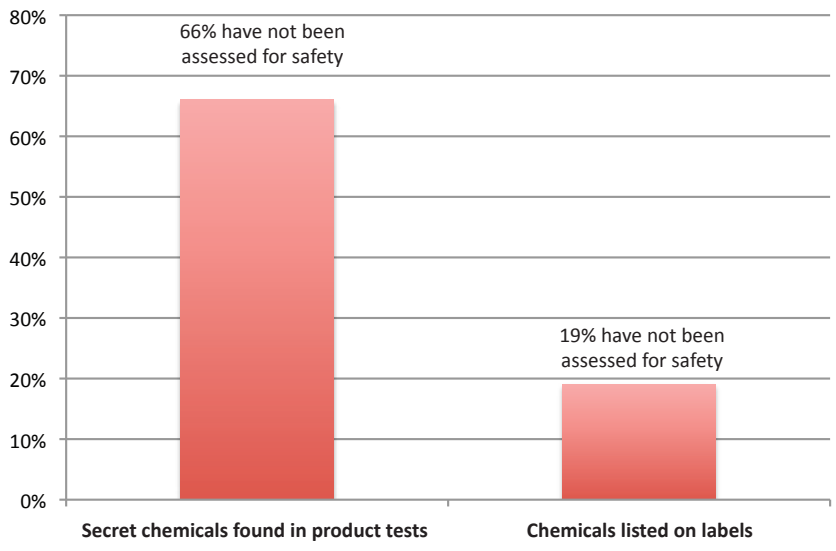
Also in the ranks of undisclosed ingredients are chemicals with troubling hazardous properties or with a propensity to accumulate in human tissues. These include diethyl phthalate, a chemical found in 97 percent of Americans (Silva 2004) and linked to sperm damage in human epidemiological studies (Swan 2008), and musk ketone, a synthetic fragrance ingredient that concentrates in human fat tissue and breast milk (Hutter 2009; Reiner 2007).

Popular fragrances contain 14 secret chemicals on average

Chemicals found in lab tests but not listed on product labels



Source: Environmental Working Group analysis of product labels and tests commissioned by the Campaign for Safe Cosmetics. Health risks from secret chemicals depend on the mixture in each product, the chemicals' hazards, that amounts that absorb into the body, and individual vulnerability to health problems.



Percentage of chemicals not assessed for safety by fragrance industry.
Source: EWG analysis of product labels, tests commissioned by the Campaign for Safe Cosmetics, and industry reports of safety assessments by the Personal Care Products Council and International Fragrance Association in the past 25 years.

the 17 name-brand fragrances tested in this study contained nearly equal numbers of secret and labeled ingredients, with 14 chemicals kept secret but found through testing, and 15 disclosed on labels.

Widespread exposure and a long-standing culture of secrecy within the fragrance industry continue to put countless people at risk of contact sensitization to fragrances with poorly-tested and intentionally unlabeled ingredients (Schnuch 2007).

According to EWG analysis, the fragrance industry has published safety assessments for only 34% of the unlabeled ingredients (for details of the analysis, see Methods section). The unassessed chemicals range from food additives whose safety in perfumes has not been assessed to chemicals with limited public safety data such as synthetic musk fragrances, which accumulate in the human body and may be linked to hormone disruption.

This complex mix of clandestine compounds in popular colognes and perfumes makes it impossible for consumers to make informed decisions about the products they consider buying.

The federal government is equally uninformed. A review of government records shows that the U.S. Food and Drug Administration has not assessed the vast majority of these secret fragrance chemicals for safety when used in spray-on personal care products such as fragrances. Nor have most been evaluated by the safety review panel of the International Fragrance Association or any other publicly accountable institution.

Fragrance secrecy is legal due to a giant loophole in the Federal Fair Packaging and Labeling Act of 1973, which requires companies to list cosmetics ingredients on the product labels but explicitly exempts fragrance. By taking advantage of this loophole, the cosmetics industry has kept the public in the dark about the ingredients in fragrance, even those that present potential health risks or build up in people's bodies.

Ingredients not in a product's hidden fragrance mixture must be listed on the label. As a result, manufacturers disclose some chemical constituents on ingredient lists but lump others together in the generic category of "fragrance." In fact, "fragrances" are typically mixtures of many different secret chemicals, like those uncovered in this study. On average,

Some chemicals that are disclosed on the labels of the products in this report also raise safety concerns. They include sunscreen and ultraviolet-protector chemicals associated with hormone disruption (Schlumpf 2004) and 24 chemical sensitizers that can trigger allergic reactions (European Commission Scientific Committee on Cosmetic Products and Non-Food Products (EC) 1999).

To make matters worse, FDA lacks the authority to require manufacturers to test cosmetics for safety, including fragranced products, before they are sold to consumers. As a result, people using perfume, cologne, body spray and other scented cosmetics like lotion and aftershave are unknowingly exposed to chemicals that may increase their risk for certain health problems.

Product tests initiated by the Campaign for Safe Cosmetics and subsequent analyses, detailed in this report, reveal that widely recognized brand-name perfumes and colognes contain secret chemicals, sensitizers, potential hormone disruptors and chemicals not assessed for safety:

- **Secret chemicals:** Laboratory tests revealed **38 secret chemicals in 17 name-brand products**, with an average of **14 secret chemicals per product**. **American Eagle Seventy Seven** contained 24 secret chemicals, nearly twice the average found in other products tested.

Results at a glance for all fragrance ingredients combined (disclosed on label or revealed in product tests)		
	Average for all 17 fragrances	**Extreme product (highest number)**
Chemical ingredients (tested + labeled)	29	40 - Giorgio Armani Acqua Di Gio
Secret chemicals (found in testing, not on label)	14	24 - American Eagle Seventy Seven
Sensitizing chemicals (can trigger allergic reactions)	10	19 - Giorgio Armani Acqua Di Gio
Hormone disruptors (can disrupt natural hormones)	4	7 - Halle by Halle Berry, Quicksilver, Jennifer Lopez J. Lo Glow
Chemicals not assessed for safety (by government or industry)	12	16 - Chanel Coco, Halle by Halle Berry, American Eagle Seventy Seven

Source: EWG analysis of 91 chemicals in 17 products – including 51 chemicals listed on product labels, and 38 unlabeled chemicals found in tests commissioned by the Campaign for Safe Cosmetics – combined with analysis of chemical hazard and toxicity data from government and industry assessments and the published scientific literature.

- **Multiple sensitizers:** The products tested contained an **average of 10 chemicals** that are known to be sensitizers and can trigger allergic reactions such as asthma, wheezing, headaches and contact dermatitis. All of these were listed on product labels. **Giorgio Armani Acqua Di Gio** contained 19 different sensitizing chemicals that can trigger allergic reactions, more than any other product tested.

Fragrance, perfume & cologne – what's the difference?

Perfumes, colognes and body sprays are often called "fragrances." But under U.S. law, the term fragrance is defined as a combination of chemicals that gives each perfume or cologne its distinct scent. Fragrance ingredients may be produced by chemical synthesis or derived from petroleum or natural raw materials. Companies that manufacture perfume or cologne purchase fragrance mixtures from fragrance houses (companies that specialize in developing fragrances) to develop their own proprietary blends. In addition to "scent" chemicals that we actually smell, perfumes and colognes also contain solvents, stabilizers, UV-absorbers, preservatives and dyes. These additives are frequently, but not always, listed on product labels. In contrast, the chemical components in fragrance itself are protected as trade secrets and described on the label only as "fragrance."

- **Multiple hormone disruptors:** A total of 12 different hormone-disrupting chemicals were found in the tested products, with an average of four in each product. **Three products each contained seven different chemicals with the potential to disrupt the hormone system: Halle by Halle Berry, Quicksilver and Jennifer Lopez J. Lo Glow**. In each product, six of these chemicals mimic the hormone estrogen, and the seventh is associated with thyroid effects. Some of these potential hormone disruptors were listed on labels; others were undisclosed and were uncovered in product testing.

- **Widespread use of chemicals that have not been assessed for safety:** A review of government records shows that the U.S. Food and Drug Administration (FDA) has not assessed the vast majority of fragrance ingredients in personal care products for safety. **The Cosmetic Ingredient Review (CIR), an industry-funded and self-policing body, has assessed only 19 of the 91 ingredients** listed on labels or found in testing for the 17 products assessed in this study. **The International Fragrance Association (IFRA) and the Research Institute for Fragrance Materials (RIFM), which develop and set voluntary standards for chemicals in the "fragrance" component of products, have assessed only 27 of the 91 ingredients** listed on labels or found in testing for the 17 products assessed in this study, based on a review of assessments published in the past 25 years.

Products were tested by Analytical Sciences, an independent laboratory in Petaluma, California. The lab found, in all, 40 chemicals in the tested fragrance products. Thirty-eight of these were secret, or unlabeled, for at least one of the products containing them, while the other two were listed on all relevant product labels. Ingredient labels disclosed the presence of another 51 chemical ingredients, giving a total of 91 chemical ingredients altogether in the tested products, including hidden and disclosed ingredients combined. Of the 17 products tested, 13 were purchased in the U.S. and four in Canada.

When sprayed or applied on the skin, many chemicals from perfumes, cosmetics and personal care products are inhaled. Others are absorbed through the skin. Either way, many of these chemicals can accumulate in the body. As a result, the bodies of most Americans are polluted with multiple cosmetics ingredients. This pollution begins in the womb and continues through life.

A recent EWG study found Galaxolide and Tonalide, two synthetic musks, in the cord blood of newborn babies (EWG 2009). Both musks contaminate people and the environment worldwide, have been associated with toxicity to the endocrine system (van der Burg 2008) and were identified in the majority of products tested for this study. Similarly, a pregnant woman's use of some fragrances and other cosmetics frequently may expose her growing fetus to diethyl phthalate (DEP), a common perfume solvent linked to abnormal development of reproductive organs in baby boys and sperm damage in adult men (Washington Toxics Coalition 2009). New research also links prenatal exposure of DEP to clinically diagnosed Attention Deficit Disorder in children (Engel 2010). This analysis found DEP in 12 of 17 products tested, at levels ranging from 30 parts per million (ppm) to 32,000 ppm in Eternity for Women.

Everyone is impacted by fragrance.

The Campaign commissioned a laboratory analysis of men's and women's fragrances as well as scented products marketed to teens of both genders; all products tested contained a range of ingredients associated with health concerns, such as allergic sensitization, and potential effects on the endocrine system or reproductive toxicity.

Numerous other products used daily, such as shampoos, lotions, bath products, cleaning sprays, air fresheners and laundry and dishwashing detergents, also contain strongly scented, volatile ingredients that are hidden behind the word "fragrance." Some of these ingredients react with ozone in the indoor air, generating many potentially harmful secondary air pollutants such as formaldehyde and ultrafine particles (Nazaroff 2004).

People have the right to know which chemicals they are being exposed to. They have the right to expect the government to protect people, especially vulnerable populations, from hazardous chemicals. In addition to required safety assessments of ingredients in cosmetics, the laws must be changed to require the chemicals in fragrance to be fully disclosed and publicly accessible on ingredient labels.

As our test results show, short of sending your favorite perfume to a lab for testing, shoppers have no way of knowing exactly which of the 3,100 fragrance ingredients may be hiding in their beauty products or even in their child's baby shampoo. This study focused on several categories of chemicals – specifically volatile compounds, semi-volatile compounds and synthetic musks. The laboratory analyses, while thorough, were not exhaustive, which means that additional chemicals of concern may also be present in the tested products.

Section 1: Allergic Sensitivity to Fragrances: A Growing Health Concern

During the last 20 years, fragrance contact allergy has become a major global health problem (Scheinman 2002). Many scientists attribute this phenomenon to a steady increase in the use of fragrance in cosmetics and household products (Johansen 2000; Karlberg 2008). Fragrance is now considered among the top five allergens in North America and European countries (de Groot 1997; Jansson 2001) and is associated with a wide range of skin, eye and respiratory reactions. Repeated, cumulative exposure to chemical sensitizers like allergenic fragrance ingredients increases the chance that a person will develop allergic symptoms later in life (Buckley 2003).

Sensitizing chemicals that can trigger allergic reactions were common in the 17 name-brand fragrances assessed in this study:

- Perfumes, colognes and body sprays contained an average of 10 sensitizing ingredients each.
- Giorgio Armani Acqua Di Gio contained 19 different sensitizing chemicals, more than any other product assessed.

Altogether, the 17 products assessed contained 24 chemicals classified as sensitizers or chemicals with sensitizing potential according to the International Fragrance Association, the European Union or the peer-reviewed scientific literature (Api 2008; EC 1999).

A clinical review of fragrance ingredients found that at least 100 are known to cause contact allergy (Johansen 2003), a potentially debilitating condition that can result in itchy, scaly, painful skin. Fragrance-induced dermatitis (eczema) can develop anywhere on the body, but the hands, face and axillae (underarm, from use of deodorants) are most often affected. Hand eczema impairs quality of life and is also of economic consequence for society, due to allergy sufferers' missed workdays and need for medical treatment.

Companies using these compounds can choose to comply with concentration limits recommended by the International Fragrance Association to help prevent users from developing allergies or contact dermatitis. But these limits are based on the assumption that people are exposed to just one sensitizer at a time. The average product tested in this report contains 10 sensitizers.

The prevalence of fragrance allergies suggests that the fragrance industry's self-imposed concentration limits are either not followed or not sufficiently protective.

Dubious honor

In 2007, the American Contact Dermatitis Society named fragrance "Allergen of the Year." (American Contact Dermatitis Society 2010).

Unlike companies selling in the U.S., those marketing fragrances in Europe are required to fully disclose common allergens. In 1999, the European Commission's Scientific Committee on Cosmetic Products and Non-Food Products (SCCNFP) published a list of well-known allergenic substances comprised of 24 chemicals and two botanical preparations. These ingredients are all used as scents, are recognized to be allergens or to form allergenic oxidation products upon storage, and must be listed on the labels of any personal care product containing them (EC 1999; van Oosten 2009); 22 of the 26 EU-recognized sensitizers were found in the products tested in this study.

The EU's SCCNFP committee decided these allergenic substances must be listed on the label whenever their concentration in a leave-on product exceeds 0.001 percent (10 parts per million or ppm).

Many of the sensitizing chemicals in perfumes and colognes are also found in a wide range of other products, increasing a consumer's total exposures and overall risk for developing allergies. For example, limonene, found in 16 of the products assessed, is a fragrance chemical that is commonly used as a solvent in cleaning products and degreasers where it may be listed as "citrus oil." While on the shelf or in the warehouse,

Allergic effects associated with exposure to fragranced products

Headaches
Chest tightness and wheezing
Infant diarrhea and vomiting
Mucosal irritation
Reduced pulmonary function
Asthma and asthmatic exacerbation
Rhinitis and airway irritation
Sense organ irritation
Contact dermatitis

Table adapted from Caress and Steinemann 2009.

limonene breaks down to form potent sensitizers (Karlberg 1997; Topham 2003). Of additional concern, limonene can react readily with ozone, both indoors and outdoors, to generate a range of hazardous pollutants such as formaldehyde, acetaldehyde and ultrafine particles. (Nazaroff 2004; Singer 2006). Some of these secondary pollutants are carcinogens and pose a variety of other health concerns such as asthma (USEPA 2005; USEPA 2007a).

Another common sensitizer is the lavender oil component linalool (found in 14 tested products) and its derivatives linalyl acetate and linalyl anthranilate, which form contact allergens when exposed to air (Hagvall, 2008; Skold, 2008). Similarly, geraniol, a rose oil component found in 12 products tested, becomes more allergenic upon storage and oxidation (Hagvall, 2007).

Perfume exposure often leads to asthma and other respiratory problems (Eberling 2009). Scientists have not determined precisely how inhaling perfume chemicals can cause respiratory distress (Eberling 2004; Schnuch 2010) or how exposures to traces of a fragrance can trigger contact allergy (EC 1999). They are trying to establish whether reactions are triggered by scent chemicals themselves (Lastbom 2003), their oxidation products (Christensson 2009) or other ingredients such as phthalates, which are strongly associated with asthma and other reactive airway symptoms (Bornehag 2010; Mendel 2007).

Fragrance allergies most often affect the wearer, but a growing number of people report adverse reactions to scented products in general, whether worn by others, displayed on store shelves or added to air fresheners and other household products (Caress and Steinemann 2009).

The fragrance industry may claim it is impossible to eliminate all chemicals in fragrance that could potentially cause allergies. Short of that, fully labeling fragrance ingredients in products would allow people to avoid specific ingredients that they know trigger their allergic reactions.

Unfortunately, many consumers do not know which specific chemical ingredient may trigger their fragrance sensitivity and contact allergy. Their safest choice is to avoid fragranced products altogether.

Table 1: Chemical sensitizers in popular perfumes, colognes and body sprays

	Total sensitizing chemicals	ALPHA-ISOMETHYL IONONE	AMYLCINNAMALDEHYDE	BENZYL ALCOHOL	BENZYL BENZOATE	BENZYL CINNAMATE	BENZYL SALICYLATE	CINNAMAL	CINNAMYL ALCOHOL	CITRAL	CITRONELLOL	COUMARIN	EUGENOL	EVERNIA FURFURACEA EXTRACT	FARNESOL	GERANIOL	HEXYL CINNAMAL	HYDROXYCITRONELLAL	ISOEUGENOL	LILIAL	LIMONENE	LINALOOL	LYRAL	LINALYL ACETATE	LINALYL ANTHRANILATE
Giorgio Armani Acqua Di Gio	**19**	●	●	●	●	●	●		●	●	●		●			●	●	●	●	●	●	●		●	●
Jennifer Lopez J. Lo Glow	**16**	●		●	●		●		●		●		●		●	●	●	●		●	●	●	●		●
Calvin Klein Eternity (for women)	**15**			●	●		●		●		●		●			●		●	●	●	●	●	●	●	●
Bath & Body Works Japanese Cherry Blossom	**13**	●			●		●	●	●		●	●	●			●			●	●		●	●		
Britney Spears Curious	**13**	●			●		●			●	●		●		●	●	●	●	●		●	●			
Calvin Klein Eternity for Men	**13**			●						●	●	●		●		●		●		●	●	●	●	●	●
Quicksilver (for men)	**13**	●					●			●	●	●			●	●			●	●	●	●		●	●
Victoria's Secret Dream Angels Wish	**13**	●					●			●		●				●	●	●		●	●	●	●	●	●
Chanel Coco	**12**						●			●	●	●				●	●			●	●	●	●	●	●
Clinique Happy	**10**	●		●						●	●					●		●		●	●	●	●		
Halle by Halle Berry	**9**				●					●	●					●				●	●	●		●	●
Abercrombie & Fitch Fierce	**8**									●	●	●				●					●	●		●	●
American Eagle Seventy Seven	**7**						●						●							●	●	●		●	●
Hannah Montana Secret Celebrity	**5**		●							●											●	●			●
Dolce & Gabbana Light Blue	**4**							●		●											●	●			
Old Spice After Hours Body Spray	**4**																				●	●		●	●
AXE Bodyspray For Men - Shock	*3*																				●			●	●

● Sensitizing chemical listed on ingredient label or found in product testing. Some of these chemicals such as eugenol, lilial or limonene, were listed on some but not all product labels, while others, such as linalool derivatives linalyl acetate and linalyl anthranilate, were not listed on any product label.

Source: EWG analysis of product labels and tests commissioned by the Campaign for Safe Cosmetics.

Section 2: Hormone-Disrupting Chemicals in Fragrance

A significant number of industrial chemicals, including some in fragrances, can act as hormone disruptors by interfering with the production, release, transport, metabolism and binding of hormones to their targets in the body (Gray 2009; Rudel 2007). Some hormone disruptors can prevent the action of naturally occurring hormones and interfere with the endocrine system. Some can also as hormone mimics that simulate the activity of hormones such as estrogen and send a hormone-like signal at the wrong time and to the wrong tissues. Depending on the dose and timing, exposure to hormone disruptors has been linked to a wide range of health problems (Heindel 2009), including an increased risk of cancer, especially breast (Breast Cancer Fund 2008) and prostate (Prins 2008) cancers; reproductive toxicity and effects on the developing fetus; and predisposition to metabolic disease such as thyroid problems (Jugan 2010) or obesity (Hotchkiss 2008).

Ingredients with the potential to act as hormone disruptors were common in the 17 name-brand fragrances assessed in this study:

- Perfumes, colognes and body sprays contained an average of four potential hormone-disrupting ingredients each.
- A total of 12 such ingredients were found in the tested products.
- Halle by Halle Berry, Quicksilver and Jennifer Lopez J. Lo Glow each contained seven different potentially hormone-disrupting ingredients, the highest number among tested products.
- Altogether, the 12 ingredients may mimic or interfere with estrogen, male hormones (androgens) and thyroid hormones. Many of the chemicals found can impact more than one of these systems, but 11 of 12 mimic estrogen or display estrogen-like activity in laboratory studies.

Scientists are still trying to understand the human health implication of lifelong, cumulative exposure to mixtures of hormonally active chemicals. The greatest concern is that these chemicals, through their ability to mimic or disrupt natural estrogen, testosterone and thyroid pathways, may impair basic body functions like tissue growth and repair that are normally regulated by natural hormone signaling (Soto 2009).

AXE: Beyond hormone disruptors

Tests found fewer hormone disruptors in AXE Body Spray for Men than in all but one other product. But that doesn't mean the product is safe. On February 10, 2010 the California Air Resources Board announced that it was issuing a $1.3 million fine to Conopco Inc. (operating under the Unilever name) for contaminating California air with volatile organic compounds (VOCs) each time a young man sprays himself with AXE. Between 2006 and 2008 the company sold 2.8 million products that failed to meet California's clean air standards (Environmental News Service 2010).

The evidence available to-date is dominated by laboratory studies known as "in vitro assays," which focus on interactions between chemicals and hormone receptors in cells grown in laboratory cultures. A smaller number of "in vivo" studies involving laboratory animals have investigated the effects of these potential hormone disruptors on living creatures. Even fewer analyses explore the possible impact of these chemicals on the human hormone system and hormone-responsive organs at current levels of exposure. Recent research has clearly demonstrated that even at low doses, exposure to hormonal disruptors during susceptible periods can have drastic consequences for health later in life. Scientists are especially concerned about the impact of hormone-disrupting chemicals during critical windows of development, such as fetal development (Breast Cancer Fund 2008).

Table 2: Hormone-disrupting chemicals in popular perfumes, colognes and body sprays

	Total hormone disrupting chemicals	BENZOPHENONE-1	BENZOPHENONE-2	BENZYL BENZOATE	BENZYL SALICYLATE	BHT	DIETHYL PHTHALATE	GALAXOLIDE	LILIAL	MUSK KETONE	OCTINOXATE	OXYBENZONE	TONALIDE
Halle by Halle Berry	**7**			●		●	●	●	●		●	●	
Quicksilver	**7**				●	●	●		●	●	●		●
Jennifer Lopez J. Lo Glow	**7**			●	●	●	●	●	●				●
American Eagle Seventy Seven	**6**				●		●	●	●		●		●
Bath & Body Works Japanese Cherry Blossom	**6**			●	●	●		●	●		●		
Calvin Klein Eternity (for women)	**6**		●	●	●		●	●	●				
Calvin Klein Eternity for Men	**5**						●	●	●		●		●
Chanel Coco	**5**				●		●	●	●		●		
Giorgio Armani Acqua Di Gio	**5**	●		●	●	●		●	●				
Victoria's Secret Dream Angels Wish	**4**				●		●	●	●				
Britney Spears Curious	**4**			●	●		●	●					
Clinique Happy	**3**							●	●				●
Hannah Montana Secret Celebrity	**3**						●	●			●		
Dolce & Gabbana Light Blue	**3**					●		●			●		
Old Spice After Hours Body Spray	**2**						●	●					
Abercrombie & Fitch Fierce	**1**						●						
AXE Bodyspray For Men - Shock	**1**							●					

● Detected in product testing or listed on ingredient label

Source: EWG analysis of product labels and tests commissioned by the Campaign for Safe Cosmetics, and results of hormone system studies in the open scientific literature.

The potential repercussions of hormone disruption range from birth defects to impaired fertility (Diamani-Kandarakis 2009).

- Thyroid hormone disruptors could impact the optimum thyroid levels crucial to normal brain development and growth in the fetus, infants and young children (Schmutzler 2007).
- Chemicals that mimic estrogen may be contributing factors for breast cancer, early puberty and other common reproductive problems (Caserta 2008). These conditions are of great concern currently. One in 8 women will be diagnosed with breast cancer in her lifetime; cumulative, lifetime exposure to estrogen is a known risk factor (Breast Cancer Fund 2008). Studies indicate that girls enter puberty one to two years earlier than they did 40 years ago; exposures to synthetic estrogenic chemicals, particularly during critical windows of development, have been proposed as a possible cause (Roy 2009).
- Chemicals that affect male hormones may be a factor in infertility (Guidice 2006), which increased by 20 percent in American couples between 1995 and 2002 (CDC 2009). Endocrine disruptors have also been implicated in birth defects of the male reproductive system, such as undescended testicles and a penile deformity called hypospadias. Incidence of both conditions appears to have risen in recent decades (Wang 2008).

Some fragrance ingredients have been tested only in laboratory cell cultures. Further research is needed to investigate the connections between endocrine disruptors and adverse health effects (Charles 2009).

Importantly, for many ingredients in the tested products, there is almost no safety information in the public domain. For example, PubMed, the federal government's database of peer-reviewed scientific research, contains no toxicity studies for the sunscreen ingredient diethylamino hydroxybenzoyl hexyl benzoate, known under a trade name Uvinul A Plus, or the preservative tetradibutyl pentaerithrityl hydroxyhydrocinnamate, known under the trade name Irganox1010. The complete list of ingredients with potential endocrine-disrupting properties may, in fact, be much larger than the 12 discussed above.

Twelve fragrance chemicals that may affect sex hormones and the thyroid

Chemical found in fragrance	Hormone system affected		
	Estrogen	Androgens (male hormones)	Thyroid
Octinoxate (octyl methoxycinnamate)	✓*		*
Oxybenzone (benzophenone-3)	✓*	✓	
Benzophenone-1	✓*	✓	
Benzophenone-2	✓*		✓*
Diethyl phthalate	✓		
Butylated hydroxytoluene (BHT)			*
Galaxolide	✓	✓	
Tonalide	✓	✓	
Musk ketone	✓		
Benzyl salicylate	✓		
Benzyl benzoate	✓		
Lilial (butylphenyl methylpropional)	✓		

✓Potential to disrupt the indicated hormone system based on findings from published cell culture studies

* Potential to disrupt the indicated hormone system based on findings from published animal studies

Source: EWG analysis of product labels and tests commissioned by the Campaign for Safe Cosmetics, and results of hormone system studies in the open scientific literature.

In order to increase the stability and shelf life of perfumes and colognes, manufacturers add sunscreen chemicals (UV absorbers, the active ingredients in commercial sunscreen products) to fragrance formulations (Cosmetics and Toiletries 2006). Thirteen of 17 fragrances assessed contained at least one UV-absorbing chemical. Eight different UV absorbers were found in these products altogether. Of note, five of these chemicals have been associated with endocrine-disrupting properties, demonstrating that the safety of sunscreen ingredients themselves remains an unresolved question.

Studies of hormone-disruption potential for fragrance ingredients

A growing body of laboratory and epidemiology studies of fragrance chemicals indicates a wide-ranging spectrum of risk, from immune toxicity to effects on the endocrine system. Since the majority of cosmetics ingredients have not undergone a comprehensive panel of toxicity tests, scientists often need to do the detective work in piecing together findings from different experimental systems, making connections among cellular, animal, human and environmental toxicity studies and weighing out the evidence that is currently available. The analysis below reviews in detail available studies on

Sunscreen chemicals in perfumes

Many of the scent chemicals used in fragrance formulations are unstable and tend to oxidize and break down when exposed to sunlight and air, during storage or when applied to human skin (Shibamoto 1983ab). Oxidized fragrance ingredients can act as potent sensitizers and phototoxic agents (Dubertret 1990). Recent in-vitro studies have suggested that exposure of common fragrance compounds to UV light can cause direct cell damage and cell death (Placzek 2007; Dijoux 2006).]

Sunscreen chemical	Number of tested fragrances that contain chemical (of 17)
Oxybenzone (benzophenone-3)	1
Benzyl salicylate	9
Octinoxate (octyl methoxycinnamate)	8
Benzophenone-1	1
Octisalate	6
Benzophenone-2	1
Avobenzone	8
Diethylamino hydroxybenzoyl hexyl benzoate	1

hormone disruption conducted for chemicals found in the 17 products tested in this study:

- **Octinoxate (octyl methoxycinnamate)** is a sunscreen ingredient and UV absorber that has been linked with estrogenic activity in vitro and in vivo. In laboratory studies with cultured cells, octinoxate binds to and stimulates the human estrogen receptor (Gomez 2005). Estrogenic effects of octinoxate on fish have also been reported (Inui 2003). In studies with laboratory animals, exposure to octinoxate increases the weight of the uterus, a hallmark of estrogenic response and an indicator of possible adverse long-term health effects in humans and wildlife (Schlumph 2001; 2003). Octinoxate has been also shown to disrupt the function of hypothalamo-pituitary-thyroid endocrine pathway and to suppress the levels of thyroid hormones in laboratory animals (Schmutzler 2004), indicating that it is likely to be a thyroid toxicant as well (Klammer 2007).

  Octinoxate was found in 7 products tested for this report.

- **Oxybenzone (benzophenone-3)** is a sunscreen ingredient that has been reported to act as an endocrine disruptor based on studies with cultured cells and with laboratory animals (Kunz 2006; Nakagawa 2002; NTP 1992). Oxybenzone stimulates estrogen receptors and increases the weight of the uterus in exposed rodents (Schlumpf 2004). It has also been shown to antagonize androgen (male hormone) receptor function in human cancer cells (Ma 2003). A study with cultured cells also found that oxybenzone increased production of the stress hormone corticosterone from adrenal gland cells (Ziolkowska 2006). In people, higher maternal exposures to oxybenzone have been linked to decreased birth weight in baby girls (Wolff 2008).

  Oxybenzone was found in one product tested for this report.

- **Benzophenone-1** is a sunscreen ingredient that has been shown to have both estrogenic and androgenic properties, as demonstrated by its ability to bind and stimulate the human estrogen receptor and to increase uterine weight in laboratory animals (Suzuki 2005; Schlumpf 2004).

  Benzophenone-1 was found in one product tested for this report.

- **Benzophenone-2** is a sunscreen ingredient that interferes with thyroid function in laboratory animals (Schmutzler 2007; Schlecht 2006). It also demonstrates estrogenic activity in studies with laboratory animals and in studies of cultured cells (Schlumpf 2004; Schlecht 2004).

  Benzophenone-2 was found in one product tested for this report.

- **Diethyl phthalate** is a fragrance solvent that has been associated with adverse effects on the development of the reproductive system in epidemiological studies. Although research is not yet definitive on the mechanism of DEP toxicity, findings from human studies raise strong concerns about the safety of DEP exposures (Swan 2008). (See Appendix B)

  Diethyl phthalate was found in 12 products tested for this report.

- **Butylated hydroxytoluene (BHT)** is a preservative and stabilizer. Two studies have linked BHT with adverse effects on the thyroid (Sondergaard 1982) and possible thyroid carcinogenesis (Ito 1985).

  Butylated hydroxytoluene was found in six products tested for this report.

- **Synthetic musks Galaxolide, Tonalide and musk ketone** have not yet been tested in long-term studies that could specifically address effects on the endocrine system (van der Berg 2008). Significant data gaps and lack of adequate animal or human studies makes definitive characterization of endocrine toxicity a challenge. However, a substantial body of data from laboratory studies with cell culture models indicates that these chemicals can affect the function of the human estrogen receptor as well as receptors for other hormones such as androgen and progesterone and stimulate the growth of hormone-sensitive cancer cells in vitro (Schreurs 2005). (See Appendix C)

  Galaxolide was found in 15 products, Tonalide in five products and musk ketone in one product tested for this report.

- **Benzyl salicylate, benzyl benzoate and scent chemical lilial (butylphenyl methylpropional)** have been demonstrated estrogenic activity in a recent study with human breast cancer cells (Charles 2009).

  Benzyl salicylate was found in eight products, benzyl benzoate in six products and lilial in five products tested for this report.

Section 3: Secret Chemicals, Hidden Health Risks

Laboratory tests commissioned by the Campaign for Safe Cosmetics revealed 38 secret chemicals in 17 name-brand fragrance products, compounds detected in tests but not listed on labels. American Eagle Seventy Seven contained the greatest number, with 24, followed by Chanel Coco with 18, and Britney Spears Curious and Giorgio Armani Acqua Di Gio with 17. On average, the fragrance products tested contained 14 secret chemicals not disclosed on labels.

The Environmental Working Group assessed these compounds against the published scientific literature, uncovering a wide range of troubling evidence pointing to potential health hazards and the likelihood for some of these compounds to accumulate in human tissues or cross the placenta when pregnant women are exposed. For many of the secret chemicals, no safety studies are publicly available in the open scientific literature.

When it comes to their use in fragrance, the safety of many of the secret compounds identified in this study cannot be assessed from the scant records of toxicity data in the public scientific literature.

Of 38 undisclosed chemicals in the 17 fragrance products assessed:

- Ten undisclosed chemicals lack any public toxicity information whatsoever in published scientific literature, according to EWG's survey of the federal government's comprehensive PubMed online scientific library.
- At least six other undisclosed compounds have three or fewer published toxicity studies, or have been deemed by a government agency to be completely lacking toxicity data for critical health risks of concern, such as cancer or birth defects. One notable example is the jasmine-scented chemical called hedione (methyl dihydrojasmonate), one of the most commonly used fragrances in perfumes and colognes. PubMed contains only one published toxicity study on hedione (Politano 2008), even though more than 1,000 metric tons of the fragrance compound are used every year worldwide.
- Nine undisclosed chemicals are potential sensitizers or contact allergens, based on laboratory studies or investigations of human volunteers, including four compounds that companies must explicitly list on product labels in the EU so consumers can avoid them if they choose.
- Six undisclosed chemicals are potential hormone disruptors based on published laboratory or epidemiology studies, including diethyl phthalate, a chemical found in 97 percent of Americans (Silva 2004) and linked to sperm damage in human epidemiological studies (Swan 2008); musk ketone, a synthetic fragrance ingredient that concentrates in human fat tissue and breast milk (Reiner 2007); octinoxate, a sunscreen chemical that may affect estrogen and thyroid hormones (Schlumpf 2004); and Tonalide, a synthetic musk that may interfere with estrogen and androgens (male hormones) (Schreurs 2005).
- 12 undisclosed chemicals pose other potential health risks. For example, in a recently published, two-year study of laboratory animals, the National Toxicology Program found evidence of carcinogenicity for the fragrance compound myrcene (NTP 2009), an ingredient in 16 of 17 fragrance products assessed in this study. Another study indicates that inhalation exposure to the fragrance compound p-cymene is associated with neurotoxicity (reduced density and number of synapses) in laboratory animals (Lam 1996). This compound was found in 11 of 17 products.

Some undisclosed ingredients are considered to be "Generally Recognized As Safe," or GRAS, by FDA (FDA 2004). Others are added to food or food packaging (FDA 2009). But even for these compounds, in many cases studies are not available to show that inhaling the compounds from fragrance sprays would be safe. For most undisclosed ingredients, very few toxicity studies are available. Much of the data that is available, including studies highlighted above and in Appendix D, indicate cause for concern and the need for further study.

Appendix D provides more details on the uses and hazards of all 38 secret chemicals. Appendix E provides information on which tested products contain each undisclosed chemical.

What's behind the label?

Avoiding questionable fragrance ingredients in personal care products, under current laws, is nearly impossible. Fragrance is found in a wide variety of consumer products including cosmetics and personal care products, cleaning products, air fresheners, candles, toys and more. Increasingly, personal care products bear claims like "natural fragrance," "pure fragrance" or "organic fragrance." None of these terms has an enforceable legal definition. All can be misleading. One study found that 82 percent of perfumes based on "natural ingredients" contained synthetic fragrances (Rastogi 1996). Moreover, just because a fragrance ingredient is derived from a plant or an animal source does not mean it is safe for everyone, since many all-natural and herbal products contain fragrance allergens (Scheinman 2001). Also, an "unscented" or "fragrance-free" personal care product may contain a "masking fragrance," a mixture of chemicals meant to cover up the odor of other ingredients (Scheinman 2000; Steinemann 2009).

Section 4. The Self-Policing Fragrance Industry

United States cosmetics law does not provide the Food and Drug Administration (FDA) with the authority to require safety testing for fragrances or to approve fragrances prior to their sale. Nor does the FDA itself systematically review the safety of cosmetic and fragrance ingredients.

Instead, two industry trade associations administer programs that set voluntary standards, which cosmetic companies and fragrance houses can choose to follow – or not. The International Fragrance Association (IFRA) sets standards for chemicals in the "fragrance" component of products, and the Personal Care Product Association's (PCPC) Cosmetic Ingredient Review (CIR) suggests voluntary standards for other cosmetics ingredients in the United States.

CIR: In the absence of government authority, an industry-funded and self-policing body called the Cosmetic Ingredient Review (CIR) Panel vouches for the safety of cosmetic ingredients. In the 30 years since its creation, this panel has only evaluated 11% of the ingredients used in cosmetics (EWG 2005). The CIR sets voluntary guidelines and does not actively monitor products for compliance.

Even for the few chemicals it does evaluate, the CIR rarely evaluates cumulative effect of exposures to toxic cosmetic ingredients over a lifetime; the aggregate exposure of cosmetic ingredients in combination with other toxic chemical exposures; the timing of exposure which can magnify the harm, particularly for infants and young children; or worker exposures in beauty salons and manufacturing plants.

The CIR has assessed only 19 of the 91 ingredients listed on labels or found in testing, for the 17 products assessed in this study.

IFRA: IFRA sets voluntary standards for fragrance houses and the manufacturers of fragrance ingredients. The compliance program, initiated in 2007, tests fragrance samples for prohibited ingredients (the program historically has only looked at prohibited ingredients and is now beginning to look at restricted ingredients as well). If there are violations, the supplier's name is posted on IFRA's website as not complying with the IFRA Code of Practice. IFRA has banned or restricted approximately 150 ingredients from fragrance (IFRA 2010).

IFRA's recommendations are based on research conducted by the Research Institute for Fragrance Materials (RIFM). IFRA members are given access to a database generated by RIFM that houses safety information – and testing gaps – on the more than 3,100 fragrance ingredients used by IFRA members.

IFRA has assessed only 22 of the 91 ingredients listed on labels or found in testing, for the 17 products assessed in this study.

Cumulative, lifetime exposure to combinations of chemicals

One-time use of fragrances highlighted in this report may not cause harm. But cosmetics and personal care products are used repeatedly and in combination with other consumer products that can also contain hazardous chemicals. We are all regularly exposed to various toxic chemicals from our air, water, food and household products. People can also be exposed to the same chemical from multiple sources.

Regulatory and standard-setting agencies do not often consider the risk to human health of cumulative exposures to the same chemical from multiple sources, nor do they consider the exposures to multiple chemicals from multiple sources. Research by government agencies, academia and independent organizations finds widespread human exposure to multiple chemicals (CDC 2009). Yet the health impacts of these exposures are largely unstudied and have never been regulated.

The market is moving

Some companies agree that it is prudent to restrict or eliminate certain hazardous chemicals from fragrances, such as musks and phthalates. For example, The Body Shop and Boots have agreed not to use artificial musks and phthalates in their products (Boots 2005; Body Shop 2008). While these are only two of many chemicals of concern used in fragrance, this is a step in the right direction that the whole industry should follow.

More than 200 companies are also fully disclosing all the ingredients – including fragrance – on their ingredient labels, as part of their commitment to the Compact for Safe Cosmetics, a pledge of safety and transparency. (See Appendix F for a list of these companies.)

Section 5: The Need for Full Disclosure of Fragrance Ingredients and Strengthened Regulation of the Cosmetics Industry

Products we put on our bodies should not contain chemicals that could damage our health. Yet due to gaping holes in federal law, it is perfectly legal for perfumes, colognes, body lotions, shampoos and other cosmetics and personal care products to contain sensitizers, hormone disruptors, reproductive toxicants, carcinogens and other toxic chemicals linked to harmful health effects.

Most people assume the government, in this case the U.S. Food and Drug Administration, regulates cosmetics the same way it does food and drugs to ensure they are safe. In reality, cosmetics are one of the least-regulated consumer products on the market today.

According to the FDA's website (FDA 2009a):

> *FDA's legal authority over cosmetics is different from other products regulated by the agency, such as drugs, biologics, and medical devices. Cosmetic products and ingredients are not subject to FDA premarket approval authority, with the exception of color additives.*

The FDA further explains that manufacturers "are not required to register their cosmetic establishments, file data on ingredients, or report cosmetic-related injuries to FDA." To keep abreast of such information, FDA maintains a *voluntary* data collection program and depends on voluntary recalls if it is determined that a cosmetic product presents a health hazard or is somehow defective (FDA 2009a).

The lack of full disclosure regarding the ingredients that make up fragrance is only one of the problems associated with a $50 billion cosmetics industry that is virtually unregulated by the federal government.

The federal law that governs this enormous industry is a mere two and a half pages long and has not been amended significantly since it was enacted 82 years ago. Most of the fragrance and cosmetic ingredients in use today didn't even exist at the time the law was written.

The United States is far behind other industrialized countries when it comes to cosmetic safety. To date, the FDA has banned or restricted 11 chemicals for use in cosmetics (FDA 2009b), in contrast to 1,100 chemicals banned or restricted from cosmetics sold in the European Union (European Parliament 2003).

Cosmetic labeling is regulated by a 1973 rule issued under the Fair Packaging and Labeling Act. The rule requires that a cosmetic label bear a declaration of ingredients "except flavor, fragrance and trade secret ingredients in descending order of predominance" (FDA 1991). This loophole in the FDA cosmetics labeling law not only means that many products contain hidden hazardous chemicals in fragrance that are not listed on labels but also that ingredients in professional salon products aren't required to be labeled at all.

As our test results show, short of sending your favorite perfume to a lab for testing, shoppers have no way of knowing exactly which of the 3,100 fragrance ingredients may be hiding in their beauty products or even in their child's baby shampoo. This study focused on several categories of chemicals – specifically volatile compounds, semi-volatile compounds and synthetic musks. The laboratory analyses, while thorough, were not exhaustive, which means that additional chemicals of concern may also be present in the tested products.

The presence of harmful chemicals in fragrance is just one example of why strengthened federal regulation and oversight of the $50 billion cosmetics industry is so urgently needed. The Campaign for Safe Cosmetics has documented numerous other products that contain harmful ingredients and contaminants, including lipsticks, nail polish, baby shampoo, sunscreen and others (Campaign for Safe Cosmetics 2010).

We need safer products and smarter laws

Comprehensive federal safe cosmetics legislation is necessary to give the FDA the authority and resources it needs to ensure cosmetics are free of toxic chemicals. New health-protective policies are needed to protect the safety and health of the American people from toxic, untested and unregulated chemicals in the cosmetics and personal care products we buy every day and should include:

- Ingredients linked to cancer and birth defects must be phased out of cosmetics
- All ingredients in cosmetics must meet a health-based safety standard that includes protections for children and other vulnerable populations.
- Pre-market safety assessment of cosmetics ingredients that includes protections for children and other vulnerable populations.
- Required listing on product labels of all chemical constituent ingredients in personal care products, including fragrances and contaminants.
- Health and safety data-sharing to avoid duplicative testing and encourage transparency and alternatives to animal testing.
- Access to information about hazardous chemicals in cosmetic products and manufacturing practices by workers.
- Federal support for the creation of innovative solutions and safe alternatives to toxic chemicals in cosmetics.
- Federal support for small businesses to help them meet federal regulations for safer products.
- Adequate funding and support of the FDA Office of Cosmetics and Colors to provide effective oversight of the cosmetics industry.

Help give the beauty industry a makeover

Here's what you can do to protect yourself, your loved ones and future generations from unnecessary exposure to toxic chemicals in personal care products.

1. **Choose products with no added fragrance**
   By choosing products without fragrance, you can reduce toxic chemical exposures for yourself and your family. It is important to read ingredient labels, because even products advertised as "fragrance free" may contain a masking fragrance. Visit our website for tips and resources to help you find safer products, and to link to EWG's Skin Deep: www.safecosmetics.org.

2. **Less is better**
   If you are very attached to your fragrance, consider eliminating other fragranced products from your routine, and using fragrance less often.

3. **Help pass smarter, health-protective laws**
   Buying safer, fragrance-free products is a great start, but we can't just shop our way out of this problem. In order for safer products to be widely available and affordable for everyone, we must pass laws that shift the entire industry to non-toxic ingredients and safer production. Ask Congress to give the FDA the authority and resources it needs to ensure the safety of cosmetics and ensure full disclosure of ingredients so consumers can make informed choices: www.safecosmetics.org/takeaction.

4. **Demand that cosmetics companies fully disclose ingredients and support those that do**
   Tell cosmetics companies that you want them to fully disclose the ingredients in the products they make – including the chemicals that are hiding under the term "fragrance." You can find companies' toll-free customer hotlines on product packages and online, and calling them only takes only a moment. We've provided some helpful talking points on our fragrance report fact sheet, which you can find online at www.safecosmetics.org/notsosexy. Companies need to hear from you, the potential customer – you have the power to vote with your dollars! In the meantime, support companies that fully disclose ingredients – see Appendix F.

Appendix A: Research Methodology

The Campaign for Safe Cosmetics commissioned tests of 17 brand-name fragrance products targeting a range of chemicals, including volatile and semi-volatile organic compounds. In the United States, 13 scent products were purchased: 10 through Amazon.com, two at Long's Drugs/CVS in Berkeley, California and one through Abercrombie & Fitch's website. Four products were purchased in Ottawa, Ontario, Canada: one at American Eagle Outfitters, two at Sephora and one at Sears.

Unopened products were sent to Analytical Sciences, an independent laboratory in Petaluma, California, for analysis. The testing methodology is described below.

Methodology for laboratory analysis

The laboratory applied slight modifications to standard United States Environmental Protection Agency methods EPA 8260 (volatiles) and EPA 8270 (semi-volatiles) for lower and higher boiling point chemical target compounds. For synthetic musks the following paper was used as a guide to develop a specific sensitive gas chromatography mass spectroscopy method: A.M. Peck, K.C. Hornbuckle, Environ. Sci. Technol., 38, p367-372, 2004.

Volatile and semi-volatile organic compounds: Fragrance GC/MS methods:
A measured amount of the commercial product was diluted into a specific amount of solvent and mixed well. One to five microliters of the solvent was introduced into the gas chromatography mass spectrometer by either a purge and trap technique or by direct injection. The gas chromatographs were programmed to separate and identify either volatile organic compounds (boiling point less than 150 degrees C) or semi-volatile organic compounds (boiling point greater than 150 degrees C).

The mass spectrometers were programmed and optimized to identify priority pollutant compounds listed by the United States Environmental Protection Agency. Over 150 chemical compounds were investigated. Commonly recognized commercial standards were used to optimize the gas chromatograph and mass spectrometer. The compounds investigated are listed in EPA method 8260 and 8270.

Significant chromatographic peaks that were not on the specific target list were identified by a computerized search of the National Bureau of Standards (NBS) Mass Spectral Database containing over 100,000 compounds, by comparing significant peaks identified in testing to the NBS database. Chemicals identified by the NBS library search are considered to be "tentatively" identified compared to other identifications from this test program that are confirmed with a specific standard matching the exact mass spectral pattern and the chromatographic retention time for a compound.

Synthetic musks:
500 milligrams of each sample were weighed to the nearest milligram and diluted into exactly 5 milliliters of hexane. The diluted samples were mixed well and then injected into a very sensitive gas chromatograph mass spectrometer (Agilent 7890 / 5975C) optimized to detect six musk target compounds using selective ion monitoring to achieve the lowest detection limits possible. Standards for the following six target musks were utilized to optimize and calibrate the GC/MS instrument: Cashmeran (DPMI), Traseolide (ATII), Galaxolide (HHCB), Tonalide (AHTN), Musk Xylene, Musk Ketone. Results for detected musks were reported in units of parts per million (ug/gm or ppm). When necessary, dilutions and reruns were made to move detected compounds into the linear calibration range of the instrument. When dilutions were used for quantitation, detection limits were increased by the dilution factor.

Methodology for data analysis

The Environmental Working Group analyzed 91 ingredients in 17 tested products by (1) assessing the ingredients against definitive government, academic and industry datasets on chemical toxicity and regulation; and (2) reviewing public scientific literature available from the fragrance and cosmetic industry or contained in the federal government's PubMed scientific library.

Definitive toxicity and regulatory databases had been previously compiled by EWG researchers in EWG's Skin Deep cosmetic safety database (www.cosmeticsdatabase.com). These databases summarize scientific information on known and probable carcinogens; reproductive and developmental toxicants; substances harmful to the nervous, immune and endocrine systems; bioaccumulative chemicals that persist in the human body; substances toxic to the environment; chemicals restricted for use in cosmetics and personal care products; and chemicals regulated by various government agencies. Chemical hazard information compiled from these databases

serves as the basis for product and ingredient scoring as described on the Skin Deep About page (http://www.cosmeticsdatabase.com/about.php).

EWG imported data on all ingredients in the tested fragrance products (listed on the label and identified through testing) into EWG's Skin Deep database, and then individually reviewed the resulting toxicity profiles produced by linking Skin Deep's toxicity and regulatory databases to the product ingredients.

EWG relied on three primary sources to identify the range of sensitizers in tested products: (1) information published on the website of the International Fragrance Association, (2) peer-reviewed scientific literature and (3) the European Commission's Scientific Committee on Cosmetic Products and Non-Food Products (SCCNFP) list of common allergenic substances (publication SCCNFP/0017/98). The EU list includes 24 chemicals and two botanical preparations that are allergens or that form allergenic oxidation products upon storage. Twenty-two of these EU-recognized 26 sensitizers were found in the products tested in this study. EWG identified two additional ingredients as potential sensitizers, linalyl acetate and linalyl anthranilate, which are derivatives of the known sensitizer linalool (also found in the products tested). In total, EWG identified 24 different sensitizers in the tested products.

For identification of potential hormonal disruptors in tested products, EWG relied on peer-reviewed scientific publications. EWG identified an initial list of relevant references from the Registry of Toxic Effects of Chemical Substances (RTECS) databases and from PubMed searches. For the 12 ingredients identified as having a potential to act as hormonal disruptors, EWG selected 20 publications from the open scientific literature as offering the best evidence currently available on endocrine toxicity for fragrance ingredients.

To determine the number of ingredients in the tested products that are associated with voluntary industry standards in the U.S., EWG analyzed the list of ingredients in fragrance products included in this study against the list of cosmetics and personal care product chemicals assessed by three industry organizations: the Cosmetic Ingredient Review (CIR) panel; the International Fragrance Association (IFRA) and the Research Institute for Fragrance Materials (RIFM). Analysis of CIR-reviewed ingredients was based on the official CIR publication on its website (http://www.cir-safety.org). Analysis of IFRA-reviewed ingredients was based on the list of 174 substances that have been banned or restricted by IFRA for use in fragrance products by IFRA-member companies, as listed on its website (http://www.ifraorg.org/). The list of studies conducted by the RIFM is not available on its website (http://www.rifm.org/) so EWG conducted a PubMed search for the query "Research Institute for Fragrance Materials" to determine which fragrance ingredients RIFM has assessed. For the purposes of this analysis, when an ingredient was not listed on the IFRA website, but had a corresponding assessment from the RIFM Expert Panel published in the open scientific literature, we considered this ingredient in our database to have been assessed by IFRA. Assessments considered in this analysis were those published in the past 25 years.

Following this analysis, EWG identified a total of 35 ingredients in the tested products that have not been assessed by CIR, IFRA or RIFM. Eleven of these ingredients are listed on the label, including five sunscreen chemicals whose safety when inhaled from perfume and cologne sprays has not been assessed. Twenty-five unassessed ingredients were found in laboratory tests but were not disclosed on the label of at least one product assessed in this study.

EWG conducted a thorough search for safety information on unassessed ingredients, including review of government databases and peer-reviewed publications indexed in PubMed. Of the 25 ingredients not disclosed on the label, two ingredients are listed by FDA in the list of substances Generally Recognized As Safe (GRAS) in food for human consumption, while an additional 13 ingredients are listed by FDA as synthetic flavoring substances and adjuvants permitted for direct addition to food. Many of these have not been assessed for safety in cosmetics. Of note, many of the ingredients had minimal toxicity information in the publicly available literature, even for bioaccumulative and potentially endocrine-disrupting chemicals such as synthetic musks.

Appendix B: Diethyl phthalate (DEP) Science Review

Diethyl phthalate (DEP), a synthetic solvent common in fragrance and other personal care products (Hubinger 2006), is a ubiquitous pollutant of the human body, found in 97 percent of Americans tested by the U.S. Centers for Disease Control and Prevention (Silva 2004). A series of recent epidemiological studies has associated DEP with a range of health problems, including sperm damage in men (Hauser 2008).

Testing by the Campaign for Safe Cosmetics found DEP in 12 of 17 fragrance products tested, in widely ranging concentrations.

- Tests detected higher levels of DEP in the Calvin Klein brand than any other brand assessed, with Eternity for Women and Eternity for Men containing 32,000 and 19,000 parts per million (ppm) of DEP, far above the next highest level (Victoria's Secret Dream Angels Wish, at 15,000 ppm).
- Four of five products for men contained DEP, at levels ranging between 130 ppm (Old Spice Body Spray) and 19,000 ppm (Calvin Klein Eternity for Men). Of products for men, only AXE Deodorant Body Spray (Shock) contained no detectable residues of DEP.
- No detectable amounts of DEP were found in fragrances sold under five brand names: AXE, Bath & Body Works, Clinique, Dolce & Gabbana and Giorgio Armani.

Health concerns related to DEP

In human epidemiological studies, DEP exposure has been linked to adverse effects on the reproductive system:

- In a study of 168 men recruited from the general population, exposure to DEP was associated with DNA damage in human sperm (Duty 2003).
- Findings from the multi-center Study for Future Families established a strong correlation between a mother's exposure to DEP and other phthalates during her pregnancy and changes to the development of her baby boy's genitals (Swan 2005).
- In a study of 130 Danish and Finish infants, scientists noted an association between the levels of DEP metabolite in the mother's breast milk and alterations in levels of male sex hormones in the baby boys (Main 2006).
- In a group of 379 men seeking care at an infertility clinic, exposure to two phthalates, DEP and DEHP, was correlated to DNA damage in sperm (Hauser 2007).
- A recent study in Mexico associated high levels of urinary DEP and an elevated risk of breast cancer (Lopez-Carrillo 2010).
- A study of children ages 4 to 9 years linked children's behavior problems to higher maternal exposure to low molecular weight phthalates such as DEP (Engel 2010).

Although the human health studies summarized above are small-scale, pilot investigations that need to be confirmed by follow-up research, their results suggest that exposure to DEP may be linked to adverse human health effects. In all of these studies, scientists compare the risk or the incidence of certain health problems with the levels of phthalate metabolites detected in study subjects' urine (Silva 2003). This type of study design does not allow scientists to establish definitively if DEP is the cause of the health problems, but it does provide a highly suggestive correlation.

Unlike other phthalates such as di(2-ethylhexyl) phthalate (DEHP) and di-n-butyl phthalate (DBP), DEP has not shown significant toxicity in any animal model, despite extensive testing (Api 2001). Studies with laboratory animals where mice and rats have been fed DEP in their diets did not detect anatomical changes in the male reproductive system, as established for other phthalates (Howdeshell 2008). However, at the highest levels of exposure, DEP has been linked to liver abnormalities, elevated cholesterol (Sonde 2000) and birth defects (ATSDR 1995). A study published in 2009 reported that a metabolite of DEP, monoethyl phthalate, lowered the sperm counts and sperm motility in exposed animals (Kwack 2009).

Scientists have not as yet determined the reason for the difference between DEP effects in humans and in laboratory animals. Importantly, human exposure is primarily dermal (through the skin), while animal testing is oral (in the diet). These differences in exposure route may have a significant effect on toxicity and genetic interspecies variations may also be a contributing factor (Swan 2008).

DEP is found in people's bodies

Numerous studies have detected the metabolite of DEP (known as MEP) in people's urine – in males and females of all ages (Silva 2004). Researchers have also detected DEP in human amniotic fluid samples collected during the second trimester of pregnancy, indicating that the fetus is exposed to phthalates during critical windows of hormone-driven development (Silva 2004).

How people are exposed to DEP

DEP can enter the body through skin contact, inhalation or ingestion (Adibi 2003). A survey of 406 men found that those who had used cologne or aftershave in the previous 48 hours had higher urinary levels of breakdown products of DEP than those who did not (Duty 2005). More than 90 percent of 163 babies studied had breakdown products of DEP and other phthalates in their urine. The infants' phthalate levels correlated with their mothers' reported use of baby lotion, powder and shampoo (Sathyanarayaya 2008).

Reviews of DEP safety

Some phthalates, but not DEP, are banned in the European Union and from toys in the United States. The International Fragrance Association and the Cosmetic Ingredient Review panel take the position that DEP is safe for use in fragrance and cosmetics (CIR 2009a; CIR 2009b; IFRA 2009). These organizations' assessment of DEP safety has not as yet taken into consideration the recent findings from human epidemiological studies that suggest increased risk for reproductive damage at current levels of exposure.

The Environmental Protection Agency lists DEP as a priority pollutant under the Clean Water Act (USEPA 2002) and DEP toxicity to aquatic species has been reported (Ghorpade 2002; Liu 2002). In late 2009, EPA identified phthalates as one of six chemical groups to be considered for regulation as potentially dangerous substances (USEPA 2009b).

Is DEP in fragrance safe?

The verdict is still out on the safety of DEP. However, the growing body of evidence from human studies suggests that manufacturers should consider using alternative ingredients until further research proves DEP safe. Importantly, our analysis shows that it is possible to make fragrance products without DEP.

Appendix C: Science Review for Musk Fragrances Identified in Tested Products

Synthetic musks are a large, poorly-studied class of chemicals added as scents to cosmetics, including perfumes, lotions and many other personal care products. The few available studies suggest some of these compounds may disrupt hormone systems or trigger skin sensitization when exposed to UV light (photosensitization) (Parker 1986).

Product tests initiated by the Campaign for Safe Cosmetics revealed the widespread use of synthetic musks in perfume, cologne and body sprays. Some of the same musks identified in fragrances have also been found in the cord blood of newborn babies, as well as in blood, breast milk and body fat (EWG 2009).

Testing by the Campaign found synthetic musks in all 17 fragrance products tested.

- Five different synthetic musk chemicals were detected in the 17 products altogether, including three that have been detected in umbilical cord blood from newborn babies: musk ketone, Galaxolide and Tonalide (TNO 2005; EWG 2009).
- Twelve products contained more than one synthetic musk. Two products each contained four different synthetic musks: Quicksilver and American Eagle Seventy Seven (both purchased in Canada).
- Galaxolide, in 15 of 17 products, was the most common of all the musks detected. Ethylene brassylate was next, found in 10 products. Studies show that Galaxolide contaminates cord blood from U.S. newborns and may interfere with estrogen in the body. The toxicity of ethylene brassylate and its potential to contaminate the human body is largely unknown. Only three studies in the open scientific literature (PubMed library) mention the chemical.

Two types of musks have been historically used in fragrances, cosmetics and personal care products: nitromusks and polycyclic musks. Nitromusks, such as musk ketone, are synthetic scent chemicals whose structure contains nitrogen. Polycyclic musks such as Galaxolide and Tonalide contain more than one carbon ring ("cycle") in their structure. New types of synthetic musks are developed frequently and substituted for older nitromusks that are being banned or phased out on grounds of toxicity (USEPA 2007; Hutter 2009). Almost no studies exist for some musks now commonly used in fragrance, including ethylene brassylate.

Musk fragrances are produced in high volumes. Industry reported manufacturing or importing between 1 and 10 million pounds of Galaxolide in 2006 alone (USEPA 2009a). For Tonalide, industry reports indicate that between 1 and 10 million pounds were imported or manufactured in 1998, the last year for which reports are available (USEPA 2009a). Due to the ubiquity of these chemicals, environmental studies from areas as diverse as the Great Lakes, Germany and China document widespread Galaxolide and Tonalide contamination of both fresh and marine water samples, air, wastewater and sludge (Chen 2007; Rudel 2006).

Studies report Galaxolide and Tonalide contamination in many species of wildlife: harbor seals, California sea lions, river otters, bottlenose dolphins, striped dolphins, pygmy sperm whales, Atlantic sharpnose shark, mink, common merganser, greater and lesser scaup, mallard and Atlantic salmon (Kannan 2005).

Types of musks found in the tested products

All 17 fragrances included at least one of the polycyclic musks – Galaxolide, Tonalide and Cashmeran – as well as the macrocyclic musk ethylene brassylate. Musk ketone, a nitromusk, was detected in one fragrance purchased in Canada. Studies show musk ketone may disrupt the endocrine system (Bitsch 2002); it has been phased out of many consumer products.

Human and environmental health concerns related to musks

Little toxicological information is available about musks currently in commerce. One report links Tonalide to liver toxicity (Steenberg 1999). But other reports say Galaxolide and Tonalide have low acute toxicity. For lack of currently available adverse evidence, in 2008, the European Union allowed continued use of both musks in consumer products (Summary Risk Assessment 2008). However, a number of in vitro studies with cultured cells suggest that these musks may affect the endocrine system by interfering with estrogen, androgen and/or progesterone hormone receptors (Seinen 1999; Schreurs 2005). Tonalide has been identified as a photosensitizer, a chemical

that becomes more toxic when exposed to sunlight on the skin (EU 2008). A number of studies have found musks toxic to aquatic life (Luckenbach 2005; Snell 2009).

What does this mean for people who use fragranced products?

Synthetic musk compounds are persistent environmental pollutants in aquatic environments. Both nitromusks and polycyclic musks such as Galaxolide and Tonalide can accumulate in the food chain (Dietrich 2004). The combination of widespread human exposure, environmental contamination and persistence raises questions about the safety of their widespread use in fragranced products. Reducing the volume of fragranced products in daily use could make a significant difference to pollution in people and the environment (Roosens 2007).

Several studies have linked personal care products and elevated body levels of different musks. A 1996 study found Galaxolide and Tonalide in body fat and breast milk after use of cosmetics and detergents (Rimkus 1996). Another study detected Galaxolide in the blood of 91 percent of Austrian students. A survey on routes of exposure linked body lotion to higher Galaxolide concentrations (Hutter 2005; 2009). A survey of 101 women found that frequent use of perfume during pregnancy resulted in elevated concentrations of Galaxolide in breast milk (Lignell 2008).

Blood tests conducted in Austria detected Galaxolide in 89 percent of 53 women over the age of 50 and associated Galaxolide concentration with frequent use of perfumes, deodorants and shampoos. In their publication, the Austrian researchers posit: "These findings could be due to the higher use of lotions and crèmes on face and hands and a more frequent use of skin care products because older persons reported more frequently dry skin. In addition, physiological aging related changes might be responsible for higher dermal absorption of synthetic musks." (Hutter 2010)

Musks have been found in people's bodies, including newborns

EWG tests of umbilical cord blood found 7 out of 10 babies had been born with Tonalide and/or Galaxolide in their blood. Six of 10 samples contained Galaxolide, four of 10 contained Tonalide and three contained both musks (EWG 2009).

Studies on toxicity of synthetic musks Galaxolide and Tonalide:

Endocrine disruption potential

- Galaxolide and Tonalide can bind to and stimulate human estrogen receptor when tested by in vitro methods (Seinen 1999). Both musks were also shown to affect the androgen and progesterone receptors in reporter gene bioassays (Schreurs 2005).
- Tonalide has been reported to increase the proliferation of estrogen-responsive human breast cancer cells (Bitsch 2002).
- In an assay with genetically modified fish, Galaxolide and Tonalide were shown to exert antiestrogenic effects (Schreurs 2004).

Environmental toxicity

- Musks have been shown to have high acute toxicity to fish, especially in the early life stages (Yamauchi 2008). Musks also interfere with important detoxification enzymes in fish (Schnell 2009).
- Low concentrations of Tonalide, Galaxolide and other musks strongly inhibited larval development in common species of crustaceans (Wollenberger 2003).
- Exposure of marine mussels to musks reduced the mussel's ability to protect itself from pollutants (Luckenbach 2005) and suppressed the growth rate in the larvae and juveniles (Gooding 2006).

Appendix D: Secret Chemicals Detected in Product Testing

Secret ingredients (found in product testing; not listed on labels)

Source: Environmental Working Group analysis of product labels, product tests commissioned by the Campaign for Safe Cosmetics and the open scientific literature.

Ingredient	How many products contain it?	What is this chemical?	Is public safety data available?
Hedione	16	Synthetic fragrance ingredient, one of the most commonly used in perfumes and colognes, with a jasmine smell. More than 1,000 metric tons of hedione is used every year worldwide.	Only one published toxicity study is found in the online science library PubMed, a developmental toxicity study conducted by the New Jersey-based Research Institute for Fragrance Materials, which reported no gross malformations of rat pups exposed to high doses in utero (Politano 2008).
Myrcene	16	A naturally occurring and synthetically produced scent and flavoring chemical, used extensively as an intermediate for production of many fragrance ingredients.	Ingredient listed in the FDA's "Food additives permitted for direct addition to food for human consumption" (21CFR 172.515). Myrcene, especially when oxidized upon air exposure, can be an irritant and a weak sensitizer. Recently completed 2-year study by the National Toxicology Panel found that myrcene had carcinogenic activity in laboratory animals (Kohicheskia 2007; Matura 2005; NTP 2009).
Galaxolide	15	A synthetic polycyclic musk, also known by its chemical name abbreviation, HHCB.	Studies of Galaxolide are limited to laboratory hormone assays and tests for the presence of the chemical in the environment and people. Galaxolide has been reported to interfere with estrogen and androgen (male) hormones. Galaxolide is bioaccumulative (builds up in the adipose tissue) and has been found in the bodies of humans, in breast milk and in wildlife (van der Burg 2008).
3,7-dimethyl-1,3,7-octatriene	14	A variant (isomer) of the fragrance and flavoring ingredient ocimene, a naturally-occurring scent chemical found in essential oils and produced by industrial chemical synthesis.	No public safety data identified. Ingredient listed in the FDA's list of "Food additives permitted for direct addition to food for human consumption" (21CFR 172.515).
Linalyl anthranilate	13	An ester of the common fragrance ingredient and known sensitizer linalool.	Ingredient listed in the FDA's "Food additives permitted for direct addition to food for human consumption" (21CFR 172.515). Public safety data limited to sensitization studies. Oxidation of linalool esters upon storage and air exposure leads to formation of allergenic oxidation products (Hagvall 2008).
Diethyl phthalate	12	A fragrance solvent commonly used at high concentrations in perfumes and colognes.	Diethyl phthalate has been tested for reproductive system impacts and estrogenic activity. The chemical is associated with effects on the reproductive system in human epidemiological studies, including sperm damage (Hubinger 2008).
Linalyl acetate	11	An ester of the common fragrance ingredient and known sensitizer linalool.	Ingredient listed in the FDA's list of substances "Generally Recognized As Safe" (21CFR 186.20). Public safety data limited to sensitization studies. Oxidation of linalool esters upon storage and air exposure leads to formation of allergenic oxidation products (Hagvall 2008).
Gamma-terpinene	11	A naturally occurring and synthetically produced scent and flavoring chemical, found in many essential oils (Chizzzola 2008).	Ingredient listed in the FDA's "Food additives permitted for direct addition to food for human consumption" (21CFR 172.515).

Ingredient	How many products contain it?	What is this chemical?	Is public safety data available?
p-cymene (paracymene)	11	A naturally occurring and synthetically produced scent and flavoring chemical; used in manufacture of musks. Known under the names p-cymene and p-isopropyl-toluene.	Ingredient listed in the FDA's "Food additives permitted for direct addition to food for human consumption" (21CFR 172.515). Inhalation exposure associated with neurotoxicity (reduced density and number of synapses) in laboratory animals (Bohl 1999).
2,6-dimethyl-7-octen-2-ol	10	A synthetic solvent and a masking ingredient that does not occur in nature; commonly included in cleaning and deodorizing (air freshener) products. Also known under its trade name dihydromyrcenol.	Recent industry review of dihydromyrcenol reported irritation but lack of sensitization associated with this ingredient. Minimal developmental toxicity reported; no studies on mutagenicity, genotoxicity or carcinogenicity conducted (Ham 2009).
Ethylene brassylate	10	A macrocyclic musk ingredient, also known under the trade name Musk T.	Ingredient listed in the FDA's "Food additives permitted for direct addition to food for human consumption" (21CFR 172.515). Only three studies on this ingredient found in PubMed. Ethylene brassylate has been reported to induce biochemical changes in skin cells, but no genotoxicity or estrogenicity (Abramsson-Zetterberg 2002; Bitsch 2002; Kim 2006).
2-tert-butyl cyclohexanol	9	A scent ingredient (US Patent 1988).	No toxicity studies identified in PubMed.
t-butyl alcohol	8	A common solvent and denaturant; also used as a flavor ingredient.	No safety studies identified in open scientific literature. FDA lists this compound among "Food additives permitted for direct addition to food for human consumption" (21CFR 172.515).
Hexyl acetate	7	A scent ingredient and a synthetic flavoring agent.	No safety studies identified in open scientific literature. FDA lists this compound among "Food additives permitted for direct addition to food for human consumption" (21CFR 172.515).
Cis-2,6-dimethyl-2,6-octadiene	7	Decomposition product from other scent ingredients (Hattori 2004).	No toxicity studies identified in PubMed.
Alpha-pinenes	6	Naturally found in oils from pines and other conifers; also produced synthetically; commonly used as scent ingredient in a wide range of consumer products.	FDA lists this compound among "Food additives permitted for direct addition to food for human consumption" (21CFR 172.515). Inhalation exposure to high concentrations associated with irritation of the respiratory airways. Alpha-pinenes oxidize upon air exposure to oxygen, forming potent respiratory irritants (Neuenschwander 2010; Nielsen 2005; Rohr 2002; Venkatachari 2008).
Cashmeran	6	A synthetic polycyclic musk, also known by its chemical name abbreviation DPMI.	Cashmeran has been reported to have estrogen-like activity in laboratory experiments with cultured cells, but no genotoxicity (Keuekordes 1997; Mori 2007).
Isopropyl myristate	6*	A thickening agent and an emollient.	Enhances skin penetration and absorption of other ingredients; has been associated with allergic contact dermatitis (Bharati 2004; Panigrahi 2005).
Phenethyl alcohol	6	A flavor ingredient found in essential oils and produced synthetically.	FDA lists the compound among "Food additives permitted for direct addition to food for human consumption" (21CFR 172.515).
Benzyl acetate	5	A scent chemical and a flavoring agent that occurs naturally in essential oils and is also produced synthetically.	FDA lists the compound among "Food additives permitted for direct addition to food for human consumption" (21 CFR 172.515). Benzyl acetate has been reported to cause mutations and have carcinogenic activity in some animal studies (NTP 1993).

Ingredient	How many products contain it?	What is this chemical?	Is public safety data available?
Tonalide	5	A synthetic polycyclic musk also known by its chemical name abbreviation, AHTN.	Has been reported to interfere with estrogen and androgen (male) hormones. Tonalide is bioaccumulative (builds up in the adipose tissue) and has been found in the bodies of humans, in breast milk and in wildlife (van der Berg 2008).
Trans-beta-ionone	5	In a group of scent chemicals called ionones, found in essential oils such as rose oil and also produced synthetically. Extensively used as fragrance and flavoring ingredients.	Several ionones, including beta-ionone, are approved by FDA for use as direct food additives (21CFR 172.515). Alpha-ionone, a structurally similar chemical, is a recognized consumer allergen. Two recent industry reports on ionone toxicity noted the absence of chronic toxicity and carcinogenicity studies for the entire group of ionones (Lalko 2007; RIFM 2007).
Limonene	3*	A fragrance chemical and flavoring ingredient derived from citrus peel; also used as a solvent in cleaning products and degreasers.	Ingredient listed in the FDA's list of substances "Generally Recognized As Safe" (21CFR 182.60). Upon storage and air exposure, limonene breaks down to form potent sensitizers. Listed by the European Union as one of the known consumer allergens (EC 1999; Karlberg 1997; Topham 2003).
Terpineol	3	A scent ingredient and a flavoring agent.	FDA lists the compound among "Food additives permitted for direct addition to food for human consumption" (21CFR 172.515). Studies in the open scientific literature are focused primarily on sensitization; studies on chronic toxicity, reproductive toxicity or carcinogenicity have not been done (Bhatia 2008).
Alpha-cedrene	3	A scent ingredient	No studies on alpha-cedrene toxicity have been identified in PubMed. A related compound, acetyle cedrene, has been associated with allergic contact dermatitis (Handley 1994; Lapczynski 2006).
Heliotropine	3	A synthetic chemical with a vanilla smell and flavor. Also called Piperonal.	Known phototoxin (Tenenbaum 1984). FDA lists the compound among "Food additives permitted for direct addition to food for human consumption" (21CFR 182.60).
Eugenol	2*	Scent chemical that occurs naturally in clove oil.	A known sensitizer; listed by the European Union as one of most frequently reported consumer allergens in fragrances (EC 1999). Listed by FDA among substances "Generally Recognized As Safe" (21CFR 184.1257).
Lilial	2*	Synthetic scent chemical also known under the name butylphenyl methylpropional.	A skin sensitizer; listed by the European Union as a recognized consumer allergen in fragrances. May have estrogenic activity (Charles 2009; EC 1999).
Dimethylbenzyl carbinyl butyrate	2	A scent ingredient; commonly used as flavoring agent.	No toxicity studies for this compound have been identified in PubMed. FDA lists the compound among "Food additives permitted for direct addition to food for human consumption" (21CFR 172.515).
Octinoxate	1*	A UV absorber and common sunscreen chemical.	Associated with adverse impact on the endocrine system (estrogen and thyroid hormones). May cause photoallergic effects (Klammer 2007; Rodriguez 2006).
Benzyl salicylate	1*	A scent chemical and a UV absorber.	Listed by the European Union as one of the most frequently reported and well-recognized consumer allergens (EC 1999). FDA allows the use of this compound as a direct food additive (21CFR 172.515).

Ingredient	How many products contain it?	What is this chemical?	Is public safety data available?
Dihydro-alpha-terpinol	1	A scent ingredient, found in pine oil; also known as dihydro-alpha-terpineol.	Published literature limited to irritation and sensitization studies. No studies available on chronic, developmental and reproductive toxicity or carcinogenicity (Bhatia 2008).
Anethole	1	A scent ingredient and a flavoring agent.	FDA lists this compound among substances "Generally Recognized As Safe" (21CFR 182.60), despite reports of liver toxicity and possible liver carcinogenicity (Marshall 1996; Newberne 1999).
Butyl acetate	1	A solvent and synthetic flavoring ingredient.	FDA lists the compound among "Food additives permitted for direct addition to food for human consumption" (21CFR 172.515). Inhalation exposure has been associated with irritation, systemic toxicity and degeneration of the olfactory epithelium (David 2001).
Isododecane	1	A volatile hydrocarbon used as solvent and emollient in cosmetics (CosIng).	No toxicity studies identified in PubMed.
Isoamyl butyrate	1	A scent ingredient and synthetic flavoring agent.	FDA lists the compound among "Food additives permitted for direct addition to food for human consumption" (21CFR 172.515). No toxicity studies identified in PubMed.
Diethyl succinate	1	A naturally occurring volatile chemical; used as solvent in fragrance formulations.	FDA lists the compound among "Food additives permitted for direct addition to food for human consumption" (21CFR 172.515). Acts as a permeation enhancer (Takahashi 2002). No toxicity studies identified in PubMed.
Musk ketone	1	A synthetic nitromusk.	Musk ketone accumulates in the bodies of people and in the environment; has been associated with estrogenic effects (Bitsch 2002; TNO 2005).

**Asterisk identifies ingredients that were disclosed on the label for some of the tested products. For these ingredients, the number listed in the column "How many products contain it?" is the number of products that did not disclose this ingredient on the label.*

Appendix E: Chemicals in 17 Fragrance Products

(detected in tests or listed on label)
Source: EWG analysis of product labels and laboratory tests commissioned by the Campaign for Safe Cosmetics.

Key:
ug/L = micrograms of chemical per liter of product
ug/g = micrograms of chemical per gram of product
NQ = detected in laboratory testing, but not quantified
ppm = parts per million
Labeled = chemical listed on product label

Abercrombie & Fitch Fierce Cologne

SD ALCOHOL 1	*Labeled*
FRAGRANCE	*Labeled*
WATER	*Labeled*
CITRONELLOL	*Labeled*
COUMARIN	*Labeled*
LINALOOL	*Labeled*
LIMONENE	*Labeled*
CITRAL	*Labeled*
GERANIOL	*Labeled*
HEDIONE	*NQ*
LINALYL ANTHRANILATE	*NQ*
LINALOOL	*NQ*
HEXYL ACETATE	*NQ*
LIMONENE	*NQ*
2,6-DIMETHYL-7-OCTEN-2-OL	*NQ*
LINALOOL	NQ
MYRCENE	*NQ*
alpha-PINENES	*NQ*
3,7-DIMETHYL-1,3,7-OCTATRIENE	*NQ*
LINALOOL	*NQ*
LINALYL ACETATE	*NQ*
CASHMERAN	*1600 ug/g*
DIETHYL PHTHALATE	*3500 ppm*
T-BUTYL ALCOHOL	*720000 ug/L*

American Eagle Seventy Seven Eau de Toilette Rollerball

SD ALCOHOL 39C	*Labeled*
FRAGRANCE	*Labeled*
WATER	*Labeled*
AVOBENZONE	*Labeled*
TETRADIBUTYL PENTAERITHRITYL HYDROXYHYDROCINNAMATE	*Labeled*
D&C ORANGE 4	*Labeled*
D&C RED 33	*Labeled*
EXT D&C VIOLET 2	*Labeled*
FD&C GREEN 3	*Labeled*
FD&C BLUE 1	*Labeled*
HEDIONE	*NQ*
LINALYL ANTHRANILATE	*NQ*
ISOPROPYL MYRISTATE	*NQ*
OCTINOXATE (OCTYL METHOXYCINNAMATE)	*NQ*
BENZYL ACETATE	*NQ*
EUGENOL	*NQ*
LILIAL	*NQ*
ETHYLENE BRASSYLATE	*NQ*
BENZYL SALICYLATE	*NQ*
LINALOOL	*NQ*
LIMONENE	*NQ*
gamma-TERPINENE	*NQ*
2,6-DIMETHYL-7-OCTEN-2-OL	*NQ*
LINALOOL	*NQ*
2-tert-BUTYLCYCLOHEXANOL	*NQ*
CIS-2,6-DIMETHYL-2,6-OCTADIENE	*NQ*
MYRCENE	*NQ*
3,7-DIMETHYL-1,3,7-OCTATRIENE	*NQ*
LINALOOL	*NQ*
LINALYL ACETATE	*NQ*
DIHYDRO-alpha-TERPINOL	*NQ*
CASHMERAN	*440 ug/g*
DIETHYL PHTHALATE	*12000 ppm*
GALAXOLIDE	*4500 ug/g*
PARACYMENE	*59000 ug/L*
TONALIDE	*750 ug/g*

AXE Body Spray for Men - Shock

SD ALCOHOL 40B	*Labeled*
BUTANE	*Labeled*
HYDROFLUOROCARBON 152A	*Labeled*
FRAGRANCE	*Labeled*
POLYAMINOPROPYL BIGUANIDE STEARATE	*Labeled*
HEDIONE	*NQ*
LINALYL ANTHRANILATE	*NQ*
ANETHOLE	*NQ*
ETHYLENE BRASSYLATE	*NQ*
LIMONENE	*NQ*
MYRCENE	*NQ*
3,7-DIMETHYL-1,3,7-OCTATRIENE	*NQ*
LINALYL ACETATE	*NQ*
GALAXOLIDE	*7.2 ug/g*
T-BUTYL ALCOHOL	*770000 ug/L*

Bath & Body Works Signature Collection Eau de Toilette - Japanese Cherry Blossom

SD ALCOHOL 1	*Labeled*
WATER	*Labeled*
FRAGRANCE	*Labeled*
AVOBENZONE	*Labeled*
OCTINOXATE (OCTYL METHOXYCINNAMATE)	*Labeled*
OCTISALATE	*Labeled*
BHT	*Labeled*
ALPHA-ISOMETHYL IONONE	*Labeled*
BENZYL BENZOATE	*Labeled*
BENZYL SALICYLATE	*Labeled*
LILIAL	*Labeled*
CINNAMAL	*Labeled*
CINNAMYL ALCOHOL	*Labeled*
CITRONELLOL	*Labeled*
COUMARIN	*Labeled*
EUGENOL	*Labeled*
GERANIOL	*Labeled*
LYRAL	*Labeled*
ISOEUGENOL	*Labeled*
LINALOOL	*Labeled*
HEDIONE	*NQ*
DIMETHYLBENZYL CARBINYL BUTYRATE	*NQ*
OCTINOXATE (OCTYL METHOXYCINNAMATE)	*NQ*
alpha-CEDRENE	*NQ*
EUGENOL	*NQ*
HELIOTROPINE	*NQ*
LILIAL	*NQ*
ETHYLENE BRASSYLATE	*NQ*
TERPINEOL	*NQ*
BENZYL SALICYLATE	*NQ*
PHENETHYL ALCOHOL	*NQ*
LINALOOL	*NQ*
TRANS-BETA-IONONE	*NQ*
HEXYL ACETATE	*NQ*
LINALOOL	*NQ*
2-tert-BUTYLCYCLOHEXANOL	*NQ*
CIS-2,6-DIMETHYL-2,6-OCTADIENE	*NQ*
3,7-DIMETHYL-1,3,7-OCTATRIENE	*NQ*
LINALOOL	*NQ*
GALAXOLIDE	*6300 ug/g*
T-BUTYL ALCOHOL	*670000 ug/L*

Britney Spears Curious Eau de Parfum

SD ALCOHOL 1	*Labeled*
FRAGRANCE	*Labeled*
WATER	*Labeled*
ALPHA-ISOMETHYL IONONE	*Labeled*
BENZYL BENZOATE	*Labeled*
BENZYL SALICYLATE	*Labeled*
CITRAL	*Labeled*
CITRONELLOL	*Labeled*
FARNESOL	*Labeled*
GERANIOL	*Labeled*
HEXYL CINNAMAL	*Labeled*
HYDROXYCITRONELLAL	*Labeled*
ISOEUGENOL	*Labeled*
LIMONENE	*Labeled*
LINALOOL	*Labeled*
HEDIONE	*NQ*
BENZYL ACETATE	*NQ*
EUGENOL	*NQ*
TERPINEOL	*NQ*
BENZYL SALICYLATE	*NQ*
LINALOOL	*NQ*
BUTYL ACETATE	*NQ*
ISODODECANE	*NQ*
HEXYL ACETATE	*NQ*
LIMONENE	*NQ*
ISOAMYL BUTYRATE	*NQ*
gamma-TERPINENE	*NQ*
2,6-DIMETHYL-7-OCTEN-2-OL	*NQ*

LINALOOL	*NQ*
2-tert-BUTYLCYCLOHEXANOL	*NQ*
CIS-2,6-DIMETHYL-2,6-OCTADIENE	*NQ*
MYRCENE	*NQ*
DIETHYL PHTHALATE	*8200 ppm*
GALAXOLIDE	*35000 ug/g*
PARACYMENE	*36000 ug/L*
T-BUTYL ALCOHOL	*770000 ug/L*

Calvin Klein Eternity for Men
Eau de Toilette Spray

SD ALCOHOL 1	*Labeled*
WATER	*Labeled*
FRAGRANCE	*Labeled*
BENZYL ALCOHOL	*Labeled*
AVOBENZONE	*Labeled*
LILIAL	*Labeled*
CITRAL	*Labeled*
CITRONELLOL	*Labeled*
COUMARIN	*Labeled*
OCTINOXATE (OCTYL METHOXYCINNAMATE)	*Labeled*
OCTISALATE	*Labeled*
EVERNIA FURFURACEA (OAKMOSS LICHEN) EXTRACT	*Labeled*
GERANIOL	*Labeled*
HYDROXYCITRONELLAL	*Labeled*
LYRAL	*Labeled*
LIMONENE	*Labeled*
LINALOOL	*Labeled*
PROPYLENE GLYCOL	*Labeled*
D&C GREEN 5	*Labeled*
FD&C YELLOW 5	*Labeled*
FD&C YELLOW 6	*Labeled*
HEDIONE	*NQ*
LINALYL ANTHRANILATE	*NQ*
HEXYL ACETATE	*NQ*
LIMONENE	*NQ*
gamma-TERPINENE	*NQ*
2,6-DIMETHYL-7-OCTEN-2-OL	*NQ*
LINALOOL	*NQ*
2-tert-BUTYLCYCLOHEXANOL	*NQ*
MYRCENE	*NQ*
alpha-PINENES	*NQ*
3,7-DIMETHYL-1,3,7-OCTATRIENE	*NQ*
LINALOOL	*NQ*
LINALYL ACETATE	*NQ*
DIETHYL PHTHALATE	*19000 ppm*
GALAXOLIDE	*6300 ug/g*
PARACYMENE	*28000 ug/L*
T-BUTYL ALCOHOL	*530000 ug/L*
TONALIDE	*4000 ug/g*

Calvin Klein Eternity for Women
Eau de Parfum Spray

SD ALCOHOL 1	*Labeled*
FRAGRANCE	*Labeled*
WATER	*Labeled*
BENZYL SALICYLATE	*Labeled*
LILIAL	*Labeled*
BENZOPHENONE-2	*Labeled*
BENZYL ALCOHOL	*Labeled*
BENZYL BENZOATE	*Labeled*
CINNAMYL ALCOHOL	*Labeled*
CITRONELLOL	*Labeled*
EUGENOL	*Labeled*
GERANIOL	*Labeled*
HYDROXYCITRONELLAL	*Labeled*
LYRAL	*Labeled*
ISOEUGENOL	*Labeled*
LIMONENE	*Labeled*
LINALOOL	*Labeled*
HEDIONE	*NQ*
LINALYL ANTHRANILATE	*NQ*
HYDROXYCITRONELLAL	*NQ*
BENZYL ACETATE	*NQ*
HELIOTROPINE	*NQ*
TERPINEOL	*NQ*
BENZYL SALICYLATE	*NQ*
PHENETHYL ALCOHOL	*NQ*
LINALOOL	*NQ*
TRANS-BETA-IONONE	*NQ*
LIMONENE	*NQ*
LINALOOL	*NQ*
MYRCENE	*NQ*
alpha-PINENES	*NQ*
3,7-DIMETHYL-1,3,7-OCTATRIENE	*NQ*
LINALOOL	*NQ*
LINALYL ACETATE	*NQ*
DIETHYL PHTHALATE	*32000 ppm*
GALAXOLIDE	*3600 ug/g*
T-BUTYL ALCOHOL	*520000 ug/L*

Chanel Coco Eau de Parfum

SD ALCOHOL 1	*Labeled*
WATER	*Labeled*
FRAGRANCE	*Labeled*
BENZYL SALICYLATE	*Labeled*
CITRAL	*Labeled*
CITRONELLOL	*Labeled*
COUMARIN	*Labeled*
GERANIOL	*Labeled*
HEXYL CINNAMAL	*Labeled*
LYRAL	*Labeled*
LIMONENE	*Labeled*
LINALOOL	*Labeled*
OCTINOXATE (OCTYL METHOXYCINNAMATE)	*Labeled*
AVOBENZONE	*Labeled*
OCTISALATE	*Labeled*
FD&C RED 4	*Labeled*
FD&C YELLOW 5	*Labeled*
FD&C BLUE 1	*Labeled*
HEDIONE	*NQ*
LINALYL ANTHRANILATE	*NQ*
OCTINOXATE (OCTYL METHOXYCINNAMATE)	*NQ*
BENZYL ACETATE	*NQ*
LILIAL	*NQ*
ETHYLENE BRASSYLATE	*NQ*
BENZYL SALICYLATE	*NQ*
PHENETHYL ALCOHOL	*NQ*
LINALOOL	*NQ*
TRANS-BETA-IONONE	*NQ*
LIMONENE	*NQ*
gamma-TERPINENE	*NQ*
2,6-DIMETHYL-7-OCTEN-2-OL	*NQ*
LINALOOL	*NQ*
CIS-2,6-DIMETHYL-2,6-OCTADIENE	*NQ*
MYRCENE	*NQ*
alpha-PINENES	*NQ*
3,7-DIMETHYL-1,3,7-OCTATRIENE	*NQ*
LINALOOL	*NQ*
LINALYL ACETATE	*NQ*
CASHMERAN	*5.5 ug/g*
DIETHYL PHTHALATE	*11000 ppm*
GALAXOLIDE	*9.5 ug/g*
PARACYMENE	*26000 ug/L*

Clinique Happy Perfume Spray

SD ALCOHOL 1	*Labeled*
FRAGRANCE	*Labeled*
WATER	*Labeled*
LILIAL	*Labeled*
TROMETHAMINE	*Labeled*
BENZYL ALCOHOL	*Labeled*
LYRAL	*Labeled*
HYDROXYCITRONELLAL	*Labeled*
LIMONENE	*Labeled*
CITRONELLOL	*Labeled*
ALPHA-ISOMETHYL IONONE	*Labeled*
LINALOOL	*Labeled*
CITRAL	*Labeled*
GERANIOL	*Labeled*
HEDIONE	*NQ*
ISOPROPYL MYRISTATE	*NQ*
HYDROXYCITRONELLAL	*NQ*
ETHYLENE BRASSYLATE	*NQ*
PHENETHYL ALCOHOL	*NQ*
LIMONENE	*NQ*
CIS-2,6-DIMETHYL-2,6-OCTADIENE	*NQ*
MYRCENE	*NQ*
GALAXOLIDE	*6400 ug/g*
T-BUTYL ALCOHOL	*470000 ug/L*
TONALIDE	*1400 ug/g*

Dolce & Gabbana Light Blue Eau de Toilette Spray

SD ALCOHOL 1	*Labeled*
FRAGRANCE	*Labeled*
WATER	*Labeled*
OCTINOXATE (OCTYL METHOXYCINNAMATE)	*Labeled*
DIETHYLAMINO HYDROXYBENZOYL HEXYL BENZOATE	*Labeled*
LIMONENE	*Labeled*
CITRAL	*Labeled*
CINNAMAL	*Labeled*
LINALOOL	*Labeled*
BHT	*Labeled*
HEDIONE	*NQ*
OCTINOXATE (OCTYL METHOXYCINNAMATE)	*NQ*
alpha-CEDRENE	*NQ*
LIMONENE	*NQ*
gamma-TERPINENE	*NQ*
2-tert-BUTYLCYCLOHEXANOL	*NQ*

MYRCENE	*NQ*
GALAXOLIDE	*16000 ug/g*
PARACYMENE	*140000 ug/L*

Giorgio Armani Acqua Di Gio Pour Homme Eau de Toilette

ETHANOL	*Labeled*
WATER	*Labeled*
FRAGRANCE	*Labeled*
LILIAL	*Labeled*
BHT	*Labeled*
FD&C BLUE 1	*Labeled*
LINALOOL	*Labeled*
GERANIOL	*Labeled*
EUGENOL	*Labeled*
ISOEUGENOL	*Labeled*
ALPHA-ISOMETHYL IONONE	*Labeled*
AMYLCINNAMALDEHYDE	*Labeled*
CINNAMYL ALCOHOL	*Labeled*
LIMONENE	*Labeled*
HYDROXYCITRONELLAL	*Labeled*
CITRONELLOL	*Labeled*
CITRAL	*Labeled*
HEXYL CINNAMAL	*Labeled*
BENZOPHENONE-1	*Labeled*
BENZYL BENZOATE	*Labeled*
BENZYL ALCOHOL	*Labeled*
BENZYL SALICYLATE	*Labeled*
BENZYL CINNAMATE	*Labeled*
HEDIONE	*NQ*
LINALYL ANTHRANILATE	*NQ*
ISOPROPYL MYRISTATE	*NQ*
HYDROXYCITRONELLAL	*NQ*
BENZYL ACETATE	*NQ*
LILIAL	*NQ*
ETHYLENE BRASSYLATE	*NQ*
PHENETHYL ALCOHOL	*NQ*
LINALOOL	*NQ*
TRANS-BETA-IONONE	*NQ*
LINALOOL	*NQ*
HEXYL ACETATE	*NQ*
LIMONENE	*NQ*
gamma-TERPINENE	*NQ*
2,6-DIMETHYL-7-OCTEN-2-OL	*NQ*
LINALOOL	*NQ*
2-tert-BUTYLCYCLOHEXANOL	*NQ*
CIS-2,6-DIMETHYL-2,6-OCTADIENE	*NQ*
MYRCENE	*NQ*
3,7-DIMETHYL-1,3,7-OCTATRIENE	*NQ*
LINALYL ACETATE	*NQ*
GALAXOLIDE	*6100 ug/g*
PARACYMENE	*100000 ug/L*

Halle by Halle Berry Eau de Parfum Spray

SD ALCOHOL 1	*Labeled*
WATER	*Labeled*
FRAGRANCE	*Labeled*
OCTINOXATE (OCTYL METHOXYCINNAMATE)	*Labeled*
LILIAL	*Labeled*
OCTISALATE	*Labeled*
OXYBENZONE (BENZOPHENONE-3)	*Labeled*
AVOBENZONE	*Labeled*
LIMONENE	*Labeled*
LINALOOL	*Labeled*
CITRONELLOL	*Labeled*
PROPYLENE GLYCOL	*Labeled*
CITRAL	*Labeled*
GERANIOL	*Labeled*
BENZYL BENZOATE	*Labeled*
BHT	*Labeled*
ACRYLATES/ OCTYLACRYLAMIDE COPOLYMER	*Labeled*
HYDROLYZED JOJOBA ESTERS	*Labeled*
FD&C YELLOW 6	*Labeled*
FD&C RED 4	*Labeled*
FD&C BLUE 1	*Labeled*
HEDIONE	*NQ*
LINALYL ANTHRANILATE	*NQ*
OCTINOXATE (OCTYL METHOXYCINNAMATE)	*NQ*
ETHYLENE BRASSYLATE	*NQ*
LINALOOL	*NQ*
HEXYL ACETATE	*NQ*
LIMONENE	*NQ*
gamma-TERPINENE	*NQ*
LINALOOL	*NQ*
2-tert-BUTYLCYCLOHEXANOL	*NQ*
MYRCENE	*NQ*
3,7-DIMETHYL-1,3,7-OCTATRIENE	*NQ*
LINALOOL	*NQ*
LINALYL ACETATE	*NQ*
CASHMERAN	*1700 ug/g*
DIETHYL PHTHALATE	*12000 ppm*
GALAXOLIDE	*14000 ug/g*
PARACYMENE	*18000 ug/L*

Hannah Montana Secret Celebrity Cologne Spray

SD ALCOHOL 1	*Labeled*
WATER	*Labeled*
FRAGRANCE	*Labeled*
OCTINOXATE (OCTYL METHOXYCINNAMATE)	*Labeled*
AVOBENZONE	*Labeled*
OCTISALATE	*Labeled*
LIMONENE	*Labeled*
LINALOOL	*Labeled*
AMYLCINNAMALDEHYDE	*Labeled*
CITRAL	*Labeled*
HEDIONE	*NQ*
LINALYL ANTHRANILATE	*NQ*
DIETHYL SUCCINATE	*NQ*
DIMETHYLBENZYL CARBINYL BUTYRATE	*NQ*
ISOPROPYL MYRISTATE	*NQ*
OCTINOXATE (OCTYL METHOXYCINNAMATE)	*NQ*
LINALOOL	*NQ*
LIMONENE	*NQ*
gamma-TERPINENE	*NQ*
LINALOOL	*NQ*
2-tert-BUTYLCYCLOHEXANOL	*NQ*
MYRCENE	*NQ*
alpha-PINENES	*NQ*
3,7-DIMETHYL-1,3,7-OCTATRIENE	*NQ*
LINALOOL	*NQ*
DIETHYL PHTHALATE	*98 ppm*
GALAXOLIDE	*7100 ug/g*
PARACYMENE	*570000 ug/L*

Jennifer Lopez J. Lo Glow Eau de Toilette Natural Spray

SD ALCOHOL 1	*Labeled*
FRAGRANCE	*Labeled*
WATER	*Labeled*
BENZYL SALICYLATE	*Labeled*
HEXYL CINNAMAL	*Labeled*
LYRAL	*Labeled*
ACRYLATES/ OCTYLACRYLAMIDE COPOLYMER	*Labeled*
ETHANOL	*Labeled*
ALPHA-ISOMETHYL IONONE	*Labeled*
BENZYL ALCOHOL	*Labeled*
BENZYL BENZOATE	*Labeled*
BHT	*Labeled*
AVOBENZONE	*Labeled*
LILIAL	*Labeled*
CINNAMYL ALCOHOL	*Labeled*
CITRONELLOL	*Labeled*
EUGENOL	*Labeled*
FARNESOL	*Labeled*
GERANIOL	*Labeled*
HYDROLYZED JOJOBA ESTERS	*Labeled*
HYDROXYCITRONELLAL	*Labeled*
LIMONENE	*Labeled*
LINALOOL	*Labeled*
TRIS(TETRAMETHYLHYDROXYPIPERIDINOL) CITRATE	*Labeled*
FD&C RED 4	*Labeled*
FD&C YELLOW 5	*Labeled*
LINALYL ANTHRANILATE	*NQ*
ISOPROPYL MYRISTATE	*NQ*
HYDROXYCITRONELLAL	*NQ*
HELIOTROPINE	*NQ*
BENZYL SALICYLATE	*NQ*
PHENETHYL ALCOHOL	*NQ*
LINALOOL	*NQ*
LIMONENE	*NQ*
2,6-DIMETHYL-7-OCTEN-2-OL	*NQ*
LINALOOL	*NQ*
MYRCENE	*NQ*
alpha-PINENES	*NQ*
3,7-DIMETHYL-1,3,7-OCTATRIENE	*NQ*
LINALOOL	*NQ*
DIETHYL PHTHALATE	*11000 ppm*
GALAXOLIDE	*27000 ug/g*
TONALIDE	*400 ug/g*

Old Spice After Hours Body Spray

SD ALCOHOL 1	*Labeled*
ISOBUTANE	*Labeled*
DIPROPYLENE GLYCOL	*Labeled*
HYDROFLUOROCARBON 152A	*Labeled*
PROPANE	*Labeled*
FRAGRANCE	*Labeled*
ISOPROPYL MYRISTATE	*Labeled*
ZINC PHENOLSULFONATE	*Labeled*
HEDIONE	*NQ*
LINALYL ANTHRANILATE	*NQ*
ISOPROPYL MYRISTATE	*NQ*
ETHYLENE BRASSYLATE	*NQ*
LINALOOL	*NQ*
HEXYL ACETATE	*NQ*

LIMONENE	*NQ*
gamma-TERPINENE	*NQ*
2,6-DIMETHYL-7-OCTEN-2-OL	*NQ*
LINALOOL	*NQ*
2-tert-BUTYLCYCLOHEXANOL	*NQ*
MYRCENE	*NQ*
3,7-DIMETHYL-1,3,7-OCTATRIENE	*NQ*
LINALOOL	*NQ*
LINALYL ACETATE	*NQ*
DIETHYL PHTHALATE	*130 ppm*
GALAXOLIDE	*380 ug/g*
PARACYMENE	*19000 ug/L*
T-BUTYL ALCOHOL	*810000 ug/L*

Quicksilver Eau de Toilette (for men)

SD ALCOHOL 39C	*Labeled*
FRAGRANCE	*Labeled*
WATER	*Labeled*
LIMONENE	*Labeled*
BENZYL SALICYLATE	*Labeled*
OCTINOXATE (OCTYL METHOXYCINNAMATE)	*Labeled*
AVOBENZONE	*Labeled*
LINALOOL	*Labeled*
LILIAL	*Labeled*
OCTISALATE	*Labeled*
ALPHA-ISOMETHYL IONONE	*Labeled*
CITRAL	*Labeled*
BHT	*Labeled*
FARNESOL	*Labeled*
COUMARIN	*Labeled*
CITRONELLOL	*Labeled*
GERANIOL	*Labeled*
ISOEUGENOL	*Labeled*
EXT D&C VIOLET 2	*Labeled*
FD&C BLUE 1	*Labeled*
HEDIONE	*NQ*
LINALYL ANTHRANILATE	*NQ*
ISOPROPYL MYRISTATE	*NQ*
OCTINOXATE (OCTYL METHOXYCINNAMATE)	*NQ*
alpha-CEDRENE	*NQ*
LILIAL	*NQ*
ETHYLENE BRASSYLATE	*NQ*
BENZYL SALICYLATE	*NQ*
LINALOOL	*NQ*
TRANS-BETA-IONONE	*NQ*
LIMONENE	*NQ*
gamma-TERPINENE	*NQ*
2,6-DIMETHYL-7-OCTEN-2-OL	*NQ*
LINALOOL	*NQ*
MYRCENE	*NQ*
3,7-DIMETHYL-1,3,7-OCTATRIENE	*NQ*
LINALOOL	*NQ*
LINALYL ACETATE	*NQ*
CASHMERAN	*710 ug/g*
DIETHYL PHTHALATE	*3100 ppm*
MUSK KETONE	*1.5 ug/g*
PARACYMENE	*130000 ug/L*
TONALIDE	*440 ug/g*

Victoria's Secret Dream Angels Wish Eau de Parfum

SD ALCOHOL 1	*Labeled*
FRAGRANCE	*Labeled*
WATER	*Labeled*
ALPHA-ISOMETHYL IONONE	*Labeled*
BENZYL SALICYLATE	*Labeled*
LILIAL	*Labeled*
CITRAL	*Labeled*
COUMARIN	*Labeled*
GERANIOL	*Labeled*
HEXYL CINNAMAL	*Labeled*
HYDROXYCITRONELLAL	*Labeled*
LYRAL	*Labeled*
LIMONENE	*Labeled*
LINALOOL	*Labeled*
HEDIONE	*NQ*
LINALYL ANTHRANILATE	*NQ*
ETHYLENE BRASSYLATE	*NQ*
BENZYL SALICYLATE	*NQ*
LINALOOL	*NQ*
LIMONENE	*NQ*
gamma-TERPINENE	*NQ*
2,6-DIMETHYL-7-OCTEN-2-OL	*NQ*
LINALOOL	*NQ*
CIS-2,6-DIMETHYL-2,6-OCTADIENE	*NQ*
MYRCENE	*NQ*
3,7-DIMETHYL-1,3,7-OCTATRIENE	*NQ*
LINALOOL	*NQ*
LINALYL ACETATE	*NQ*
CASHMERAN	*37 ug/g*
DIETHYL PHTHALATE	*15000 ppm*
GALAXOLIDE	*3300 ug/g*
PARACYMENE	*31000 ug/L*

Appendix F: Companies that Fully Disclose Ingredients

As of April 5, 2010, the following companies have fully disclosed all ingredients – including fragrance – on their ingredient labels and on EWG's Skin Deep Cosmetics Database as part of their commitment to the Compact for Safe Cosmetics, a pledge of safety and transparency administered by the Campaign for Safe Cosmetics. Learn more by visiting http://safecosmetics.org/compact.

A Mano Bath
Acquarella LLC
Advanced Cosmetic Technologies
African Earth Skincare
Afterglow Cosmetics, Inc.
Aguacate & Co.
Alchemilla
Alexami Cosmetics
Alima Cosmetics, Inc.
Alvin Connor Ltd
Amurie
Apala Beauty
Apriori Beauty
Arganat Inc.
Aroma 1
Aromaland Inc.
Aubrey Organics, Inc.
Aurora Nova, LLC
Ava Anderson NonToxic
Avalon Organics
Awa Skin Care
B.SOAPURE LLC
BABYBEARSHOP, LLC
BECAUSE Skin Care, LLC
Babo Botanicals
Bare Organics Inc.
Bath By Bettijo LLC
Beauté Minéral
Beaute Club
Belle's Botanicals
Belli Cosmetics
Beyond Coastal
Binda Baby Essentials
Bloomin' Cosmetics
Body Sense
Bombastic Aromatics
Botanical Skin Works
Bottoms Up Pty Ltd
Buddha Nose Ltd
Bum Boosa Bamboo Baby Wipes
CNaturals, Inc.
California Baby
Castle Baths
Cedar Spring Herb Farm
Chagrin Valley Soap and Craft
Chartreuse, Inc.
Classy Minerals
CleanWell Company
Clovertree Apothecary
Coastal Classic Creations
Cocoon Apothecary
Colorganics, Inc
Consonant Body Organic Skincare
Cosmetics Without Synthetics
Cosmic Tree Essentials Ltd.
Cotton Creek Soap and Sundries
Daily Essence
Dancing Dingo Luxury Soap
Dermaviduals USA
Destiny Boutique
Divine Minerals
Divine Response
Doctor T's Supergoop!
Dr. Bronner's Magic soap
Earth Mama Angel Baby
EO Products/Small World Trading Co Inc.
Edamame, Inc.
Eden's Kiss
Elemental Herbs
Elements Naturals
Elysian Dream
Emily Skin Soothers, Inc
Enfusia-Cocoon
Enkido
Erth Minerals
Essence of Wellbeing
Eve Organics
Ferro Cosmetics
Florence Quesnel Aromatherapie
French Transit, Ltd
For My Kids
Garden Girl Natural Skin Care
Garden of Eve
Generation to Generation
Glam-Nation, LLC
Glengarry Gardens
Gluten Free Beauty
Golden Earth Inc.
Good for You Girls
Green Beauty Cosmetics
Greenbody Greenplanet
HCGCoach.com LLC
Herbaliz
Herban Lifestyle
Hippy Heaven Natural Beauty
Holistic Body Care
Infantbows, LLC
Inika
Innocent Oils
Intelligent Nutrients

Iredale Mineral Cosmetics, Ltd.
JaDora Cosmetics
Jes Collection Health & Beauty, LLC
Jess' Bee Natural
Jiade Organic Cosmetics
Karen's Botanicals
Keys, Inc.
Khushi Spa Products
LUVU Beauty
La Vie Celeste
Lalabee Bathworks
Lash Advance
Lauren Brooke Mineral Cosmetiques
Les Parfums d'Isabelle
Lily Organics, Inc.
Little Forest Natural Baby Products
Live Native
Longhairlovers/ICP Corp.
Loriannz
Loving Naturals
MOM Enterprises, Inc.
MadeOn Lotion Bars
Maia's Mineral Galaxy
MammaMichal Freshly Made All Natural Body Care Products
Marie Veronique Organics
Max Green Alchemy Ltd.
Meadowlake Farm Honeybee Products LLC
MendMeShop
Mexitan Products
MineralFace FX
Mixaroma Inc
Monet Minerals
MoniMay, Inc.
Morning Indigo, LLC
Motherlove Herbal Company
Mountain Girl Botanics, Ltd.
MuLondon Natural Organic Skincare
Musq
My Lip Stuff
My Mama's Love
NONTOXIQUE BEAUTY, LLC
Naked Soapworks
Natural Family Botanicals
Natural Formulations
Natural Resource Group
NaturalCurls
Nature's Baby Organics
Nature's Boundaries
Nature's Pharma
Naturity LLC
Naturoli
Naturopathica Holistic Health
Nine Naturals
Novena Cosmeceuticals Inc
Nurture My Body
Nuvo Cosmetics
Oblige by Nature
Over the Rainbow Lotions & Notions
PROVIN Cosmeceuticals
Pangea Naturals, Inc.
Paul Penders Company
Pharmacopia
Phat Organics/Aloha Products
Pink Quartz Minerals
Planet Botanicals
Poof's Closet
Pristine Recovery
Pure Anada Cosmetics
Purple Prairie Botanicals
RJ Mineral Cosmetics
Rejuva Minerals
SAXX Mineral Makeup and Organics
Salon Naturals, LLC
Samantharoma LLC
Sensibility Soaps, Inc.
Serenity Skincare
Shan Image Consulting
SheAyurvedics Skin Care
Shea Butter Market
Shea-Janee
Silver Unicorn Spirit Gifts
Skin LLC
Skin QR Organics
SkinGenX
Soap for Goodness Sake
Sun Putty
SunCat Natural Mineral Makeup
SunnyWipes
Sweetsation Therapy
Swissclinical
Symmetry Skin Quenchers
TawnaHillBaby
Tea Naturals Skin Care
Terressentials
The Merry Hempsters
Trillium Herbal Company
Trukid
U.P. Bathworks
UV Natural International PTY LTD
UrbanDetox
Verdure Botanoceuticals Skin Care
Vysada Inc. Ayurvedic Natural Skin Care
W.S. Badger Company
Welstar
Whole Truth Holistic Health Solutions
Wholistic, Inc
XANGO, LLC
Yellowstone Bees Inc.
Zoe Organics
Zosimos Botanicals, LLC
free of, inc.
ibody science
lolo levu
non toxic skin care
radiantLIFE
rms beauty
suki pure skin care
the formulaah
thinkbaby and thinksport
Weleda

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