1,4-DIOXANE

Not listed on ingredient labels, 1,4-dioxane is a contaminant linked to cancer found in products that create suds, such as shampoo and liquid soap.

1,4-dioxane, a carcinogen linked to organ toxicity, may be found in as many as 22 percent of the more than 25,000 cosmetics products in the Skin Deep database,[1] but you won't find it on ingredient labels. That's because 1,4-dioxane is a contaminant created when common ingredients react to form the compound when mixed together.

What is 1,4 Dioxane?

1,4-dioxane is generated through a process called ethoxylation, in which ethylene oxide, a known breast carcinogen, is added to other chemicals to make them less harsh. This process creates 1,4-dioxane. For example, sodium laurel sulfate, a chemical that is harsh on the skin, is often converted to the less-harsh chemical sodium laureth sulfate (the "eth" denotes ethoxylation). The conversion process can lead to contamination of this ingredient with 1,4-dioxane. Other common ingredients that may be contaminated by 1,4-dioxane include PEG compounds and chemicals that include the clauses "xynol," "ceteareth" and "oleth." Most commonly, 1,4-dioxane is found in products that create suds, like shampoo, liquid soap and bubble bath. Environmental Working Group's analysis suggests that 97 percent of hair relaxers, 57 percent of baby soaps and 22 percent of all products in Skin Deep may be contaminated with 1,4-dioxane.[1] Independent lab tests co-released by the Campaign for Safe Cosmetics in 2007 showed that popular brands of children's bubble bath and body wash contained 1,4-dioxane.

Found In

- Products that create suds (such as shampoo, liquid soap, bubble bath)
- Hair relaxers
- Others

What to look for on the label

- Sodium laureth sulfate
- PEG compounds
- Chemicals that include the clauses xynol, ceteareth and oleth

Health Concerns

Cancer

Research shows that 1,4-dioxane readily penetrates the skin.[2] 1,4-dioxane is considered a probable human carcinogen by the U.S. Environmental Protection Agency[3] and is listed as an animal carcinogen by the National Toxicology Program.[4] It is included on California's Proposition 65 list of chemicals known or suspected to cause cancer or birth defects.[5]

Vulnerable Populations

Babies & Children (https://www.safecosmetics.org/population/babies-children/), Pregnant Women (https://www.safecosmetics.org/population/pregnant-women/), Teenagers (https://www.safecosmetics.org/population/teenagers/), Women of Color (https://www.safecosmetics.org/population/women-of-color/)

Regulations

Banned/found unsafe for use in cosmetics in Canada

How to Avoid?

The FDA does not require 1,4-dioxane to be listed as an ingredient on product labels because the chemical is a contaminant produced during manufacturing. Without labeling, there is no way to know for certain whether a product contains 1,4,-dioxane, making it difficult for consumers to avoid it.

Alternative processes to ethoxylation do exist, but many companies don't take advantage of them. Vacuum-stripping can remove 1,4-dioxane from an ethoxylated product, or manufacturers can skip ethoxylation entirely by using less-harsh ingredients to begin with.[6] Organic standards do not allow ethoxylation at all, and some conventional companies, such as Johnson & Johnson, have agreed to alter the process that results in this contamination.

A study by the Organic Consumers Association[7] shows that 1,4-dioxane is nonexistent in a variety of cosmetics certified under the USDA National Organic Program. Therefore a good way to avoid exposure to this chemical is to buy products that have been certified under this program. Additionally, consumers can avoid products that contain sodium laureth sulfate, PEG compounds, and chemicals that include the clauses xynol, ceteareth and oleth.

Explore other Chemicals

Mica (https://www.safecosmetics.org/chemicals/mica/)

Ethanolamine Compounds (MEA, DEA, TEA And Others) (https://www.safecosmetics.org/chemicals/ethanolamine-compounds/)

Homosalate (https://www.safecosmetics.org/chemicals/homosalate/)

PABA (https://www.safecosmetics.org/chemicals/paba/)

Fragrance (https://www.safecosmetics.org/chemicals/fragrance/)

Triclosan (https://www.safecosmetics.org/chemicals/triclosan/)

View All Chemicals of Concern > (/chemicals/)

Looking for a Safer Alternative?

Use Clearya's app to find non-toxic products! Clearya alerts you to toxics and helps you find safe products.

Clearya (https://www.clearya.com/)

Visit Clearya > (https://www.clearya.com/)

Your Action Helps

Together, we can make beauty safer for all.

Take Action Today!

(/take-action/)

FILTER BY:

By Population

By Products

By Health Concerns

References

[1] Environmental Working Group (2007). 1,4- dioxane. Available at: https://www.ewg.org/news-insights/news/cancer-causing-chemical-14-dioxane-contaminates-americans-drinking-water (https://www.ewg.org/news-insights/news/cancer-causing-chemical-14-dioxane-contaminates-americans-drinking-water). Accessed April 19, 2022.
[2] Spath, D.P. "1,4-Dioxane Action Level." March 24, 1998. Memorandum from Spath, Chief of the Division of Drinking Water and Environmental Management, Department of Health Services, 601 North 7th Street, Sacramento, California 95814 to George Alexeeff, Deputy Director for Scientific Affairs, Office of Environmental Health Hazard Assessment. Available at: http://www.oehha.ca.gov/water/pals/pdf/PAL14DIOXAN.pdf (http://www.oehha.ca.gov/water/pals/pdf/PAL14DIOXAN.pdf). Accessed April 19, 2022.
[3] Environmental Protection Agency (2003). 1,4 Dioxane (CASRN 123-91-1). Integrated Risk Information System. Available at: https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0326_summary.pdf (https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0326_summary.pdf). Accessed April 19, 2022.
[4] National Toxicology Program (2005). Report on Carcinogens, 11th Edition; U.S. Department of Health and Human Services, Public Health Service, National Toxicology Program, January 2005. Available at: http://ntp.niehs.nih.gov/ntp/roc/eleventh/profiles/s080diox.pdf (http://ntp.niehs.nih.gov/ntp/roc/eleventh/profiles/s080diox.pdf). Accessed April 19, 2022.
[5] Office of Environmental Health Hazard Assessment (OEHAA) (2004). State of California Environmental Protection Agency. Chemicals known to the state to cause cancer or reproductive toxicity. Available at: https://oehha.ca.gov/proposition-65/proposition-65-list. (https://oehha.ca.gov/proposition-65/proposition-65-list) Accessed April 19, 2022.
[6] Environmental Working Group (2007). 1,4- dioxane. Available at: https://www.ewg.org/skindeep/ingredients/726331-1-4-dioxane/ (https://www.ewg.org/skindeep/ingredients/726331-1-4-dioxane/). Accessed April 19, 2022.
[7] Organic Consumers Association (2008). "Natural Consumer Products Found Contaminated with Cancer-Causing 1,4-Dioxane in Groundbreaking Analysis Released by OCA." Available online: https://www.organicconsumers.org/news/natural-consumer-products-found-contaminated-cancer-causing-14-dioxane-groundbreaking-analysis (https://www.organicconsumers.org/news/natural-consumer-products-found-contaminated-cancer-causing-14-dioxane-groundbreaking-analysis). Accessed April 19, 2022.

Add Impact To Your Inbox

Get our emails to stay in the know.

Campaign for Safe Cosmetics (https://www.safecosmetics.org)

get to know us

about us (/about/)
see our financials (https://www.bcpp.org/about-us/financials/)
contact us (/contact/)
news (/news/)

take action

campaigns (/take-action/campaign/)
individuals (/take-action/)
businesses (/business/)
press (/take-action/media/)

get the facts

chemicals of concern (/chemicals/)
products of concern (/products/)
laws and regulations (/resources/regulations/)
tips (https://www.safecosmetics.org/resources/safe-cosmetics-tips/)

(htt p:// (htt p:// twit (htt p:// inst

connect
facebook.com/safecosmetics)
twitter.com/SafeCosmetics HQ)
instagram.com/safecosmetics hq)
1388 Sutter Street, Suite 901
San Francisco, CA 94109-5400