

THE UNINTENTIONAL INGREDIENT: 1,4-DIOXANE

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Over the years, technology and the yearning for higher profit margins have encouraged the inclusion of cheap petroleum-based chemicals into our skin and body care products. The ubiquitous term “petrochemicals” is defined by the Energy Information Administration as “organic and inorganic compounds and mixtures that include but are not limited to organic chemicals, cyclic intermediates, detergents, and surface active agents.” Most often used as inactives in skin and body care formulas, these inexpensive multisyllabic chemical compounds frequent ingredient decks as alternatives to safer, more natural components.

Environmental concerns over the production and transportation of non-renewable resources aside, industrial petrochemical production is a complex, energy-intensive process. It involves altering raw materials (crude oil and natural gas) by the employment of high heat and metal catalysts. These raw materials must go through a series of transformations to become an end use product, as demonstrated below:



Accordingly, in order to explore the 1,4- dioxane issue, we must briefly examine the transformation of the feedstock ethane gas into its intended end use chemical.

Ethane gas is derived from natural gas, similar to propane and butane. When ethane gas is steam cracked, it changes into man-made, nature-identical ethylene gas, a primary petrochemical. Next, ethylene is altered using oxygen and a metal catalyst (such as silver), then ethylene oxide, an intermediate, is produced. When ethylene oxide is combined with a fatty acid(s) to form an end use substance, ethoxylation occurs and generates dioxane (a.k.a. 1,4-dioxane), an accidental byproduct. To illustrate this point, if one combines twenty molecules of ethylene oxide with cetyl and stearyl alcohol, the end result is cetareth-20, an ingredient that harbors the 1,4-dioxane contaminate.

The EPA classifies dioxane as a probable human carcinogen. While dioxane is purposely used in the industrial manufacture of fumigants and coolants, it unintentionally appears in our skin and body care products. One will never see “1,4-dioxane” in an ingredient deck because it is a possible contaminate of an ingredient, not an ingredient itself. Furthermore, because the FDA barely regulates the cosmetics

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industry, you are responsible for steering clear of the approximately fifty-six ingredients that may contain dioxane. However, an easy way to elude this unintentional contaminate is to remember to avoid the following four groups of chemicals: PEGs (polyethylene glycols), polyethylenes, “xynols” (e.g., octoxynol), and “eths” (e.g., sodium laureth sulfate). Although it is distressing that consumers must police ingredient decks in order to avoid harmful substances, at least this task isn’t as daunting when broken down into four categories.

Currently, the Green Spa Network skin care team is working on easy-to-read educational charts and a comprehensive chapter on skin and body care for the Tool Kit. Please continue to visit the Green Spa Network website (www.greenspanetwork.org) for more updated information as it becomes available.



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