Low Tox Method - Assignment 2

Response ID:55 Data

1. Ingredient research skill-building

1. What's your name?

Corrine Sultana

2. What chemical have you been given to research?

Sodium Laureth Sulfate

3. How would one describe this chemical or group of chemicals form a structural point of view?

Sodium Laureth Sulfate (SLES) is also known as sodium;2-dodecoxyethyl sulfate (IUPAC Name) [1] and Polyoxyethylene lauryl ether sodium sulfate (CAS Name) [2]

The Molecular Formula is: (C2H4O)nC12H26O4S.Na [3]

SLES is manufactured through a reaction of n-dodecyl alcohol (a fatty alcohol often source from coconut oil acids) with ethylene oxide (a flammable man-made gas) followed by sulfation (formation of esters or salts) with chlorosulfonic acid (liquid) or sulfamic acid (solid) and neutralization with sodium hydroxide (also known as lye, soda or caustic soda) [4]

SLES is a surfactant used as a cleansing agent in soaps and detergents. Surfactants allow oil and water molecules to bind together to remove grime and dirt.

1. https://pubchem.ncbi.nlm.nih.gov/compound/23665884
2. https://commonchemistry.cas.org/detail?cas_rn=9004-82-4&search=Sodium%20Laureth%20Sulfate
3. https://commonchemistry.cas.org/detail?cas_rn=9004-82-4&search=Sodium%20Laureth%20Sulfate
4.https://pubchem.ncbi.nlm.nih.gov/compound/23665884#section=Methods-of-Manufacturing

4. Is there anything in the research (provide study links or articles written by authorities on the subject either journalists or scientists) that suggests this chemical can cause harm?

There is limited data and research articles discussing SLS. There is more for the parent ingredient of SLS.

Our skin's outermost layer is specially designed to keep harmful stuff out, and this is where a surfactant can cause problems. Using a chemical that weakens this defence mechanism can potentially cause our skin harm. And some surfactants are more irritating to our skin than others. [5] SLES can be categorised as an irritant to some people.

The EWG rates SLES as Amber 1-3 with a higher rating for use around the eyes or inhalation [6]

The Final Report of the Amended Safety Assessment of Sodium Laureth Sulfate and Related Salts of Sulfated Ethoxylated Alcohols by the Cosmetic Ingredient Review (CIR) Expert Panel recognized that there are data gaps regarding use and concentration of the ingredient. The panel noted that sodium laureth sulfate can produce eye and/or skin irritation but concluded that it is safe as a cosmetic ingredients in the present practices of use and concentration when formulated to be non irritating [7]

However there are contamination concerns from the manufacturing process that include the possible carcinogens 1,4-Dioxane and Ethylene Oxide. Since 1,4-dioxane is formed during the synthesis of polyoxyethylene ether sulfate, it has been detected at high concentrations in cleansing products that contained a lot of polyoxyethylene ether sulfate. [8] Products that contain a lower amount of SLES as part of their overall ingredient quantities have a lower risk of 1,4-Dioxane contamination. The individual ingredients used to manufacture SLES on their own have toxicity, mutagenic and carcinogenic concerns according to Pub Chem.

A recent study (May 2021) reviewed the acute toxicity and sublethal effects of sodium laureth sulfate on oxidative stress enzymes in benthic oligochaete worm (Tubifex tubifex) [9] The study found SLES exposure induced mortality, autotomy, and changes in behavioral responses in Tubifex tubifex at an acute level, and exposure altered the levels of oxidative stress biomarkers.

5. https://medicine.uq.edu.au/article/2019/12/what-sodium-lauryl-sulfate-and-it-safe-use
6. https://www.ewg.org/skindeep/ingredients/706089-SODIUM_LAURETH_SULFATE/
7.https://journals.sagepub.com/doi/pdf/10.1177/1091581810373151
8. https://pubmed.ncbi.nlm.nih.gov/23859116/
9.https://www.sciencedirect.com/science/article/abs/pii/S1532045621000259

5. Based on the research you gathered, to what level would you feel comfortable using a product with this ingredient in it?

As SLES can be considered irritating to the skin, it may be best avoided by those with sensitivity issues, skin conditions like ezecma / psoriasis, young children or the elderly.

The possible contamination concerns are a substantial reason to consider not using this ingredient. While rated as safe by the CIR and low concern by EWG, there are other alternatives to select that are of lower health risk

6. Where might we find this chemical appearing in our day to day lives?

SLES is found in a variety of cleaning products for home and body including shampoo, soap, cleansers, bubble bath, shaving cream, hair products and household cleaning products.

The highest concentration of SLES use is in baby products (≤= 25%), shampoos (≤= 50%), bath products (≤= 24%), bath soap (≤= 47%) and cleansers (≤= 25%) [10]

10. https://journals.sagepub.com/doi/pdf/10.1177/1091581810373151

7. If we were to stop using products with this chemical, what could we use instead? A couple of brand ideas that omit that ingredient or DIY recipe links to support the transition for people. (If you've found it to be safe and supported that with evidence, just pop N/A here")

An alternative option for soap is to use Castille soap that is manufactured from vegetables without the use of a range of synthetic chemicals to produce. This is available to buy as is, use in DIY recipes and is found in a variety of products including Dr Bonners. There are a wide variety of ingredients that are alternatives and many products that do not contain SLES on the market (one example is Moo Goo who don't use it in their full range). Just look out for SLES on the label and pick something with out it.