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Short Communication

The Impact of Sodium Lauryl Sulfate on Human Health and Environment

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ABSTRACT

There has been much discussion about the effects of Sodium Lauryl Sulphate (SLS), an anionic surfactant that is widely used in personal care and household cleaning products, on the environment and human health. This comprehensive review meticulously examines the effects of SLS on human health, dispelling prevalent misconceptions surrounding its ocular and dermal irritation potential, acute oral toxicity, oncogenicity, and alleged chronic health effects. Contrary to common beliefs, extensive scientific evidence consistently affirms the safety of SLS for use in consumer products when appropriately formulated and employed as intended. Additionally, the review delves into the environmental implications of SLS, focusing on its toxicity to aquatic ecosystems and biodegradability in natural environments. While SLS exhibits moderate toxicity to aquatic organisms in its raw form, its rapid biodegradation ensures minimal environmental impact, with decomposition by-products posing negligible harm to ecosystems. Overall, this review offers clarity on the genuine health implications of SLS, reinforcing its suitability for everyday use in household and personal care products while underscoring the importance of responsible formulation and usage practices.

Keywords: Sodium Lauryl Sulphate, Toxicity, Human health, Environment.

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INTRODUCTION

Sodium Lauryl Sulphate (SLS) is a commonly used anionic surfactant that is highly valued for its remarkable emulsifying properties in home cleaning solutions. It is also known by the names Sodium Dodecyl Sulphate and sodium lauryl ether sulphate. Its versatile application spans a broad array of products, encompassing dishwasher, laundry, and spray cleaner detergents. The concentration of SLS present in these consumer goods varies depending on factors such as product type and manufacturer specifications. Typically, cosmetic formulations contain SLS concentrations ranging from 0.01% to 50%, whereas cleaning products may feature concentrations within the range of 1% to 30%. This variability underscores the diverse applications and formulations in which SLS is utilized across the household cleaning merchandise landscape.[1-4] Sodium lauryl sulfate is available in both synthetic and naturally derived variants. In its synthetic form, SLS undergoes a series of chemical transformations initiated with lauryl alcohol, sourced either from petroleum or plant origins. Hydrogen lauryl sulphate is first produced when Sulphur trioxide and lauryl alcohol interact. SLS is produced by neutralization with sodium carbonate after that. This process makes it easier to synthesize SLS, a crucial component in numerous consumer products, utilizing both natural and synthetic resources. The versatility of this manufacturing process underscores the adaptability of SLS production to diverse sourcing methods, contributing to its widespread availability in various consumer goods.[5]

SLS, characterized by its CAS number 151-21-3 and molecular weight of 288.38 g/mol, is recognized as a nonvolatile substance with high solubility in water. At room temperature, SLS readily dissolves in water, displaying solubility levels ranging from 100 to 150 g/L. Additionally, the partition coefficient (log Pow) for SLS is 1.6. indicating a pronounced affinity for water and classifying it as a relatively hydrophilic compound. This hydrophilic nature underscores SLS's propensity to interact favorably with water molecules, rendering it suitable for a wide range of applications where aqueous solubility is paramount.[6-8] Exposure to Sodium Lauryl Sulfate (SLS) primarily transpires through the utilization of products containing this ingredient. The frequency of routine household cleanings, which are typically reported as occurring

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1-2 times per week on average, is closely correlated with the frequency of exposure to SLS through household cleaning products. As individuals engage in routine cleaning activities, such as laundering clothes, washing dishes, or cleaning surfaces, they come into contact with cleaning products that often contain SLS. Consequently, the frequency and duration of exposure to SLS are closely tied to the frequency of engaging in household cleaning tasks, emphasizing the significance of understanding its presence in such products and its potential effects on human health and the environment.[9] Although the probability of oral exposure to cleaning products is generally low, documented instances of such exposure do occur, predominantly among children. These incidents often result from accidental ingestion, highlighting the importance of safeguarding cleaning products, particularly those containing ingredients like sodium lauryl sulfate, from being accessed by children. Despite efforts to store cleaning products securely and out of reach, accidents can still happen, underscoring the necessity for increased awareness and preventive measures to mitigate the risk of inadvertent ingestion among vulnerable populations, such as children.[10]

THE EFFECTS OF SODIUM LAURYL SULFATE ON HUMAN HEALTH

Eye Irritation

When administered undiluted or at elevated concentrations, sodium lauryl sulfate shares a common trait with many chemicals in potentially causing eye irritation. However, studies have indicated that at concentrations below 0.1% (w/w), lab animals' eyes show no signs of irritation when exposed to SLS.[1] Manufacturers must adhere to mandatory labeling regulations outlined by the Consumer Product Safety Commission, ensuring that products are appropriately labeled with necessary warnings and first aid instructions.[11] This has been associated with the potential to cause significant harm to the eyes, including severe damage and even blindness.[12] Citing research results from Green *et al.*, that was published in the Lens and Eye Toxicity Research journal, claims often highlight the impact of Sodium Lauryl Sulfate (SLS) on corneal healing following eye damage, whether physical or chemical in nature. The study elucidates that exposure to elevated concentrations of SLS subsequent to corneal damage can impede the healing process, thus shedding light on potential repercussions in ocular health.[13]

Another misconception regarding SLS relates to its alleged association with cataract formation in ocular health.[14,15] References to SLS potentially causing cataract formation often trace back to a research that was published in 1987 in the Journal of Biological Chemistry.[16] In laboratory settings, cataract formation has been artificially induced by immersing the eye lens in highly concentrated solutions of sodium lauryl sulfate. It's crucial to remember that, despite being helpful in experiments, this approach doesn't fairly represent the exposure levels that people normally experience from using household cleaning products. Ocular irritation has been reproduced in experiments on living animals with SLS concentrations comparable to those in rinse-off personal care products with 20% or more SLS. This method offers a more accurate evaluation of the possible impacts of SLS on eye health in practical situations.[15] Furthermore, it's critical to emphasize that direct contact between the lens and SLS is naturally prevented by the shape of the eye. Located deep within the eye and protected by the cornea, SLS cannot enter the lens when using consumer items on a regular basis. Thus, the anatomical configuration of the eye effectively mitigates the danger of exposure to SLS through normal consumer usage.[17,18]

Skin Irritation

Studies on the toxicity to the skin have shown that extended contact with a 1%-2% (w/w) solution of SLS can cause increased trans epidermal water loss in the stratum corneum, the skin's outermost layer. The increased water loss could cause a temporary, moderate skin irritation.[19,20] Human patch testing, usually involving a 24-hr exposure, have determined that Sodium Lauryl Sulphate (SLS) concentrations more than 2% are considered irritating to normal skin.[2,21,22] Dermal irritation frequently increases in tandem with an increase in SLS concentration and an extension of direct skin contact time.[2] Regarding skin exposure to SLS found in cleaning products, it's crucial to remember that this exposure is usually transient, generally lasting only a few minutes as opposed to hours.[9]

While cleaning products containing SLS can pose dermal irritation risks if inadequately formulated, it's essential to recognize that not all products containing SLS inherently provoke skin irritation. Proper formulation is key to mitigating potential adverse effects, ensuring that SLS-based cleaning products maintain a balance between effective cleansing and skin compatibility.[23,24] Effective formulation development encompasses deliberate strategies aimed at minimizing skin irritation, often achieved through the incorporation of cosurfactants. By employing such approaches, manufacturers can engineer products containing SLS that exhibit mildness and non-irritating properties when applied to the skin. Nonetheless, owing to the inherent potential for irritation associated with SLS, regulatory mandates necessitate consumer product manufacturers to conduct thorough testing to accurately assess dermal toxicity. Subsequently, products must be appropriately labeled with warnings and first aid instructions in compliance with mandatory labeling requirements outlined by the Consumer Product Safety Commission.[11]

Toxicity via ingestion

The term "acute oral toxicity" describes the negative consequences that appear right away after using a medicine. This metric is commonly measured using the median Lethal Dose (LD_{50}), which is the concentration of a chemical (typically expressed in milligrams per kilogram of body weight) required to kill half of the animals exposed to that dosage in laboratory testing. Formulations and materials are deemed non-toxic if their LD_{50} is at least 5,000 mg/kg.[11] Sodium lauryl sulphate has acute oral toxicity when employed as a raw material; toxicity values in rat studies have been reported to vary from 600 to 1,288 mg/kg. These findings imply that rats who only eat SLS may be susceptible to poisoning.[6-8] Despite the fact that the acute oral toxicity of SLS is well-established, it is crucial to take this into account when evaluating the compound's overall safety. It's important to realize that factors other than the toxicity of a product's component parts might affect how dangerous a consumer product is. Rather, the entire formulation affects it. Even while SLS in its pure form at 100% concentration may show acute oral toxicity with an LD_{50} of less than 5,000 mg/kg, formulations with diluted or lower concentrations of the substance may not always pose a toxic concern and may even be deemed non-toxic. Since SLS is permitted for both direct and indirect use in food on the U.S. Food and Drug Administration's list of multifunctional additives, this rule applies to a wide variety of products, including food items. Thus, even as you understand the potential issues associated with SLS, it's crucial to consider its use in formulations as well as its general safety profile in a range of consumer items.[25]

Oncogenicity

One of the most alarming assertions surrounding SLS is the unsubstantiated claim of its carcinogenic properties.[15,26] The assertion's origins remain uncertain, but it appears to stem from various misinterpretations of scientific research. Notably, there is no substantiated scientific data indicating that SLS poses a carcinogenic risk.[27,28] Numerous reputable organizations, including as the European Union, California Proposition 65, the U.S. Environmental Protection Agency, the International Agency for Research on Cancer (IARC), and the U.S. National Toxicology Programme, have not identified Sodium Lauryl Sulphate (SLS) as a carcinogen. An essay by the American Cancer Society (ACS) in 1998 attempted to correct popular misconceptions about SLS's possible carcinogenicity.[26] The belief that SLS may have carcinogenic properties often stems from studies where the compound is utilized as a reference substance to assess the carcinogenic potential of other agents. For instance, the article authored by Birt *et al.*, is frequently referenced in support of claims suggesting the carcinogenicity of SLS.[29]

The study conducted by Birt *et al.*, serves as a notable example of how sodium lauryl sulfate has been misinterpreted and misrepresented in scientific research. In this study, SLS was utilized solely as a vehicle for processing the agent under investigation, rather than being the focus of the research itself. Importantly, the study did not present any findings suggesting that SLS itself has carcinogenic effects. However, despite the absence of evidence implicating SLS in carcinogenicity, its widespread use as a solubilizing agent in toxicological studies has inadvertently contributed to public misconceptions regarding its potential for chronic toxicity. The unintended consequence of using SLS as a solubilizing agent is that it may inadvertently lead to the misattribution of toxicological effects observed in experimental studies to SLS itself, rather than the primary agent under investigation. This phenomenon underscores the importance of careful interpretation and contextualization of research findings, particularly when SLS is used as a component in experimental protocols. It is essential for researchers and consumers alike to critically evaluate the role of SLS in scientific studies and recognize when its presence is incidental rather than indicative of its inherent toxicity. By doing so, we can mitigate the propagation of misinformation surrounding SLS and foster a more accurate understanding of its safety profile.[30]

Opposition to SLS often revolves around assertions of its carcinogenic potential, citing concerns regarding a chemical interaction between SLS and formaldehyde, resulting in the formation of nitrosamines as a secondary by-product.[26] The assertion that SLS and formaldehyde can combine to generate nitrosamines is unfounded due to the absence of nitrogen atoms in either compound. Nitrosamines, characterized by the presence of two nitrogen atoms, cannot be formed from a reaction between SLS and formaldehyde, as neither molecule contains nitrogen. While nitrosamines have been linked to various cancers and are classified by the IARC as carcinogens, the association between SLS and the formation of nitrosamines lacks scientific validity. Therefore, attributing the presence or use of SLS to nitrosamine production is inaccurate.[28] Misconceptions often link sodium lauryl sulfate with another potentially carcinogenic by-product, 1,4-dioxane. However, it's crucial to note that this association is inaccurate.[26] 1,4-dioxane is categorized by the IARC as possibly carcinogenic to humans. During the ethoxylation process, this molecule may contaminate certain surfactants, including Sodium Laureth Sulphate (SLES), also referred to as sodium lauryl ether sulphate. It is commonly known that surfactants and 1,4-dioxane pollution are related.[28,29]

Adverse effects on organ function

Many claims indicate that sodium lauryl sulphate can enter the circulation, build up in critical organs like the heart, liver, lungs, and brain, and cause damage.[12,14] Claims concerning the safety of SLS frequently cite the thorough analysis contained in the Cosmetic Ingredient Review (CIR) Final Report. This research provides a comprehensive evaluation of the safety profile of SLS by closely examining its absorption and excretion patterns in both human and animal models.[1] According to the CIR, while sodium lauryl sulfate can indeed penetrate the skin upon direct application, the bulk of the substance tends to remain either on or within the skin's surface. Should any portion be absorbed into the bloodstream, the liver quickly breaks it down into additional metabolites that are soluble in water. These metabolites are swiftly eliminated from the body via urine, feces, and occasionally, exhaled breath.[2,17,18,31] Claims suggesting the bioaccumulation of sodium lauryl sulfate in vital organs and its linkage to systemic toxicity or organ damage lack substantiation in both the Cosmetic Ingredient Review report and broader scientific literature. Accusations regarding the potential for SLS to accumulate in humans and induce organ damage are unfounded, as there is no empirical evidence supporting such assertions.[17,18,27]

Additionally, the claim attributing hair loss and baldness to SLS is purportedly supported by the CIR report.[12,14,26] The report highlights concerns regarding the potential effects of high concentrations of sodium lauryl sulfate on hair health but stops short of attributing hair loss directly to SLS exposure. Rather, because of its tendency to deposit on hair follicles, it recommends against using SLS in cosmetic products applied to the skin at concentrations higher than 1%. The paper also emphasizes the necessity of greater investigation to properly comprehend the ramifications of such deposition. In 2015, there was still insufficient scientific data to substantiate the claim that cutaneous exposure to SLS causes hair loss.[1,2] A 1998 study published in the European Journal of Dermatology is frequently cited in claims made regarding sodium lauryl sulfate's potential to cause hair loss. It is crucial to highlight, nevertheless, that the main goal of this work was to employ SLS as an experimental irritant in order to examine how oxidative stress affects skin irritation. The study did note that SLS was deposited on the root sheath of hair follicles, but it made no inferences about how this would contribute to hair loss. Moreover, little information is available about the long-term impacts of SLS deposition on hair follicles. It is quite improbable that SLS causes chronic hair loss, though, given how widely and continuously it is used in hair care products. Therefore, there is no scientific evidence to substantiate claims linking SLS-containing cosmetics to hair loss.[32]

Sensitivity

Another unsupported assertion regarding sodium lauryl sulfate is its purported capacity to induce significant dermal sensitization. Sensitization refers to the ability of a substance to provoke hypersensitivity reactions upon reapplication to the skin, often resulting in allergic or photodynamic responses. Despite common misconceptions, scientific evidence does not support the notion that SLS has the capacity to become sensitized. Notably, SLS is not listed on any official lists of substances that are suspected or known to sensitize. Therefore, labeling SLS as a sensitizer is not supported by scientific consensus and is considered inaccurate.[12,14] A sensitizer is defined as a substance capable of inducing hypersensitivity reactions upon reapplication to the skin, often leading to allergic or photodynamic responses. Despite common misconceptions, scientific evidence does not support the notion that Sodium Lauryl Sulfate (SLS) possesses sensitization potential. Sensitization studies involve exposing subjects to a substance repeatedly to assess their immune response. In the case of SLS, extensive research, including patch testing and skin irritation studies, has failed to establish it as a sensitizer. SLS does not appear on any established lists of known or suspected sensitizers compiled by authoritative bodies such as regulatory agencies and dermatological organizations. These lists are based on rigorous scientific evaluation of available data on substances' potential to induce allergic reactions or sensitization in humans. Furthermore, SLS has been widely used in cosmetic and personal care products for decades without significant reports of allergic reactions or sensitization. This long history of safe use further supports the conclusion that SLS is not a sensitizer. Therefore, labeling SLS as a sensitizer lacks scientific support and is considered inaccurate. It is crucial to rely on evidence-based assessments to evaluate the safety profile of substances like SLS, rather than perpetuating misconceptions based on unfounded claims.[27]

Additional Long-Term Toxic Effects

There is insufficient evidence to support claims that SLS causes long-term harmful health effects, including mutagenicity, reproductive toxicity, developmental toxicity, neurotoxicity, and endocrine disruption. It is incorrect to refer to SLS as a sensitizer as a result. Thorough evaluations from reliable sources, such as the TOXNET® database of the National Library of Medicine, do not classify SLS as a neurotoxicant, endocrine disruptor, reproductive or developmental toxicant, or known or suspected mutagen. This confirms that SLS poses no appreciable long-term health hazards and supports its safety profile for use in a range of consumer items.[14]

Indeed, it is crucial to emphasize that Sodium Lauryl Sulfate (SLS) does not present any known chronic health risks. Comprehensive information from reliable sources, including the TOXNET® database of the National Library of Medicine, confirms that SLS is not categorized as a neurotoxicant, endocrine disruptor, reproductive or developmental toxicant, or known or suspected mutagen. This thorough assessment highlights SLS's safety profile and offers assurances about its use in a variety of consumer goods.[27]

THE EFFECTS OF SODIUM LAURYL SULFATE ON ENVIRONMENT

Toxicity to aquatic ecosystems

By "aquatic toxicity," we mean the harmful effects on aquatic organisms resulting from exposure to particular chemicals or formulations. The median Lethal Concentration (LC_{50}), which is the concentration of a chemical (often stated in milligrams per Liter of water) needed to induce fatality in half of the test population within a given period, is commonly used to measure this type of toxicity. Generally speaking, substances that have an LC_{50} of 100 mg/L or more are not harmful to aquatic life. This measure is essential for determining the possible effects of chemicals on aquatic ecosystems and for directing the development of regulations that safeguard aquatic habitats.[33]

The assessment of toxicity in consumer products poses a nuanced challenge, particularly concerning substances like Sodium Lauryl Sulfate (SLS). Although SLS, in its unprocessed form, shows a moderate level of toxicity to aquatic life, this does not necessarily indicate that diluted SLS-containing consumer items are dangerous. In fact, product compositions using SLS may make them non-toxic to aquatic life. It's important to understand, though, that the toxicity of SLS can vary based on a number of variables, including temperature, water hardness, and the particular marine species. Therefore, a thorough comprehension of these factors is necessary in order to appropriately assess how SLS-containing goods affect the environment.[34-36] When cleaning product ingredients are introduced into natural water systems, they undergo significant degradation processes. According to Eco toxicity studies, fish and other aquatic life are typically not significantly harmed by surfactant concentrations of 0.5 mg/L in natural water. Evidence, however, points to the possibility that anionic surfactants can cause chronic toxicity at considerably lower concentrations-possibly as low as 0.1 mg/L. These results highlight the necessity of considering exposure's long-term consequences and putting in place reliable monitoring methods to safeguard aquatic ecosystems from potential harm. It emphasizes how crucial it is to strike a balance between cleaning solutions' environmental impact and efficacy in order to preserve aquatic environments.[37,38]

Degradability in Natural Environments

An important consideration when evaluating a substance's potential influence on the environment is its biodegradability, or its capacity to break down into innocuous parts in a short amount of time usually 96 hr or less. Sodium lauryl sulfate demonstrates rapid biodegradability under both aerobic and anaerobic conditions, ensuring its swift decomposition without leaving a long-lasting footprint in the environment. This characteristic underscores the environmental compatibility of SLS, as it efficiently breaks down into harmless components, minimizing its persistence in ecosystems. As a result, SLS poses minimal risk of accumulating in the environment and causing adverse effects, further emphasizing its suitability for use in consumer products.[8,31,39] The biodegradation process of Sodium Lauryl Sulfate (SLS) primarily involves the breakdown of its sulfate ester bond, resulting in the formation of inorganic sulfate and fatty alcohol. Subsequently, these fatty alcohols undergo oxidation, leading to the generation of fatty acids. These fatty acids are then metabolized through β-oxidation pathways and eventually mineralized, becoming essential components of biomass. As a result, the decomposition by-products of SLS pose minimal harm to the environment, as they are benign and seamlessly assimilated into natural systems. This efficient breakdown mechanism ensures that SLS does not persist in the environment, contributing to its overall environmental compatibility.[39]

CONCLUSION

In conclusion, this comprehensive review critically assesses the prevailing misconceptions surrounding Sodium Lauryl Sulfate (SLS) and offers a nuanced understanding of its impact on human health and the environment. Despite widespread concerns fueled by misunderstandings and misinformation, a robust body of scientific evidence consistently confirms the safety of SLS for use in consumer products. Contrary to popular belief, SLS does not present significant risks of chronic health effects such as carcinogenicity, organ toxicity, or hair loss when employed as directed in household and personal care products. Moreover, claims regarding its potential ocular and dermal irritation, acute oral toxicity, and purported chronic health effects lack empirical substantiation. Furthermore, while SLS may display moderate toxicity to aquatic organisms in its raw form, its rapid biodegradation in natural environments ensures minimal environmental impact. The decomposition by-products of SLS pose negligible harm to ecosystems, underscoring the importance of understanding the compound's fate in the environment. Responsible formulation and usage practices are pivotal in mitigating any potential risks associated with SLS-containing products. This review highlights the necessity of informed decision-making grounded in scientific evidence rather than succumbing to unfounded fears or misconceptions. By providing clarity on the genuine health implications of SLS, this review aims to promote a more balanced and evidence-based discourse surrounding its usage. Ultimately, when used as intended and in compliance with regulatory criteria, SLS continues to be a safe and effective component for regular usage in household and personal care products.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

REFERENCES

1. Cosmetic Ingredient Review (CIR). Final report on the safety assessment of sodium lauryl sulfate and ammonium lauryl sulfate. Int J Toxicol. 1983; 2(7): 127-81.
2. Cosmetic Ingredient Review (CIR). Final report on the safety assessment of sodium lauryl sulfate and ammonium lauryl sulfate. Int J Toxicol. 2005; 24(1): 1-102.
3. Proctor and Gamble (P&G). Safety Data Sheets. Available at: http://www.pgproductsafety.com/productsafety. Accessed August 19, 2015.
4. Seventh Generation. Material Safety Data Sheets. Available at: http://www.seventhgeneration.com/material-safety-data-sheets. Accessed August 17, 2015.
5. Product Bulletin: Sodium Lauryl Sulfate. Stephan Company, Northfield, Illinois; 2012.

6. Material Safty Data Sheet: STEPANOL WA-EXTRA K. Stephan Company, Northfield, Illinois; 2006.
7. GuideChem. Sodium Dodecyl Sulfate (CAS 151-21-3) MSDS. Available at: http://www.guidechem.com/msds/151-21-3.html. Accessed August 19, 2015.
8. OECD Screening Information Data Set (SIDS). Sodium Dodecyl Sulfate. Available at : http://www.chem.unep.ch/irptc/sids/OECDSIDS/151213.htm. Accessed August 19, 2015.
9. U.S. EPA Exposure Factors Handbook. Chapter 17: Consumer Products. 2011. Available at: http://www.epa.gov/ncea/efh/pdfs/efh-chapter17.pdf. Accessed August 19, 2015.
10. Goulding R.Ashforth G.Jenkins H. Household products and poisoning. Br Med J. 1978; 1(6108): 286-7.
11. Consumer Product Safety Commission (CPSC). Federal Hazardous Substances Act Regulations, 16 C.F.R. §1500;2015.
12. Healthy Choices. Sodium Lauryl Sulphate. Available at: http://www.healthy-choices.co.uk/sls.html. Accessed June 30, 2015.
13. Green K. Johnson R.E. Chapman J.M. Nelson E. Cheeks L. Preservative effects on the healing rate of rabbit corneal epithelium. Lens Eye Toxic Res. 1989; 6: 37-41.
14. Health Report. Sodium Lauryl Sulphate-Sorting Fact from Fiction. Available at: http://www.health-report.co.uk/sodium_lauryl_sulphate.html. Accessed July 7, 2015.
15. ***15***. Tekbaş ÖFUysal Y.Oğur R. *and*. Non-irritant baby shampoos may cause cataract development. TSK Koruyucu Hekimlik Bülteni. 2008; 7(1).
16. Mandal K. Chakrabarti B. Thomson J. Siezen R.J. Structure and stability of gamma-crystallins. Denaturation and proteolysis behavior. J Biol Chem. 1987; 262: 8096-102.
17. Gloxhuber C. Künstler K. Anionic Surfactants: Biochemistry, Toxicology, Dermatology. 2nd ed., Vol. 43. New York: Marcel Dekker; 1992.
18. Madsen T. Boyd H.B. Nylén D. Pedersen A.R. Petersen G.I. Simonsen F. Environmental and Health Assessment of Substances in Household Detergents and Cosmetic Detergent Products. Miljøprojekt: Danish Environmental Protection Agency; 2001 [In Environmental Project No 615].
19. De Jongh C.M. Verberk M.M. Withagen C.E. Jacobs J.J. Rustemeyer T. Kezic S. Stratum corneum cytokines and skin irritation response to sodium lauryl sulfate. Contact Dermatitis. 2006; 54(6): 325-33
20. De Jongh C.M. Verberk M.M. Spiekstra S.W. Gibbs S. Kezic S. Cytokines at different stratum corneum levels in normal and sodium lauryl sulphate-irritated skin. Skin Res Technol. 2007; 13(4): 390-8.
21. Piret J. LaForest G. Bussières M. Bergeron M.G. Subchronic (26- and 52-week) toxicity and irritation studies of a novel microbicidal gel formulation containing sodium lauryl sulfate in animal models. J Appl Toxicol. 2008; 28(2): 164-74.
22. Dahl M. Trancik R.J. Sodium lauryl sulfate irritant patch tests: degree of inflammation at various times. Contact Dermatitis. 1977; 3: 263-6.
23. Effendy I. Maibach H.I. Surfactants and experimental irritant contact dermatitis. Contact Dermatitis. 1995; 33: 217-25.
24. Lammintausta K. Maibach H.I. Wilson D. Irritant reactivity on males and females. Contact Dermatitis. 1976; 17: 276-80.
25. U.S. Food and Drug Administration (FDA), 21 C.F.R. §172.822; 2015.
26. American Cancer Society. Debunking the Myth; 1998. Available at: http://web.archive.org/web/20030803065801/http://www.cancer.org/docroot/nws/content/nws_2_1x_debunking_the_myth.asp. Accessed July 8, 2015.
27. U.S. National Library of Medicine (NIH). TOXNET: Toxicology Data Network. Available at: http://toxnet.nlm.nih.gov/cgi-bin/sis/search2/f?./temp/~HPylzG: 3. Accessed July 8, 2015.
28. International Agency for Research on Cancer (IARC). IARC monographs on the evaluation of carcinogenic risks to humans, 1999; 71: 589-602.
29. Rastogi S.C. Headspace analysis of 1,4-dioxane in products containing polyethoxylated surfactants by GC-MS. Chromatographia. 1990; 29: 441-5.
30. Birt D.F. Lawson T.A. Julius A.D. Runice C.E. Salmasi S. Inhibition by dietary selenium of colon cancer induced in the rat by bis(2-oxopropyl) nitrosamine. Cancer Res. 1982; 42: 4455-9.
31. Singer M.M. Tjeerdema R.S. Fate and effects of the surfactant sodium dodecyl sulfate. Rev Environ Contam Toxicol. 1993; 133: 95-149
32. Willis C.M. Reiche L. Wilkinson J.D. Immunocytochemical demonstration of reduced Cu, Zn-superoxide dismutase levels following topical application of dithranol and sodium lauryl sulphate: an indication of the role of oxidative stress in acute irritant contact dermatitis. Eur J Dermatol. 1998; 8: 8-12.
33. European Union Reference Laboratory for Alternatives to Animal Testing (EURL ECVAM). Aquatic Toxicity. Available at: https://eurl-ecvam.jrc.ec.europa.eu/validation-regulatory-acceptance/environmental-toxicity-fate/Env-Aquatic-Toxicity. Accessed August 15,2015.
34. Lewis M.A. The effects of mixtures and other environmental modifying factors on the toxicities of surfactants to freshwater and marine life. Water Res. 1992; 26(8): 1013-23.
35. Warne M.S.Schifko A.D. Toxicity of laundry detergent components to a freshwater cladoceran and their contribution to detergent toxicity. Ecotoxicol Environ Saf. 1999; 44: 196-206.
36. Zheng Y.J.Chen L.Chen Y.P.Huang R. Acute toxicity of Sodium Dodecyl Sulfate (SDS) on selected aquatic organisms. Nong Ye Huan Jing Ke Xue Xue Bao. 2006; 25: 496-8.
37. Lewis M.A. Chronic and sublethal toxicities of surfactants to aquatic animals: a review and risk assessment. Water Res. 1991; 25(1): 101-13.
38. Abel P.D. Toxicity of synthetic detergents to fish and aquatic invertebrates. J Fish Biol. 1974; 6: 279-98.
39. Karsa D.R.Porter M.R., eds. Biodegradability of Surfactants. Glasgow: Blackie Academic and Professional; 1995.

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