Safety Assessment of Sodium Hydrosulfite as Used in Cosmetics

Status:	Draft Report for Panel Review
Release Date:	September 11, 2026
Panel Meeting Date:	October 5 - 6, 2026

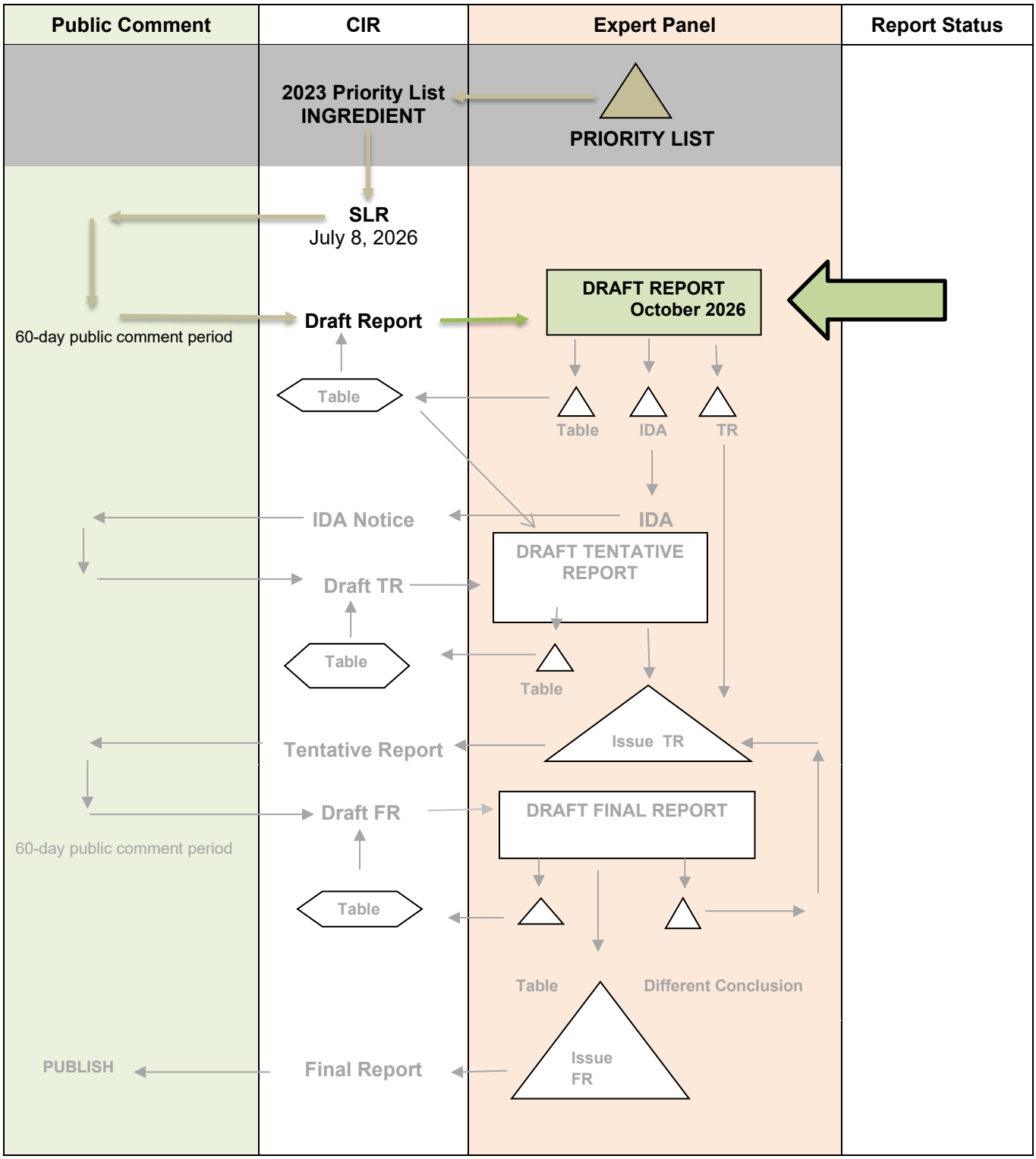
The Expert Panel for Cosmetic Ingredient Safety members are: Chair, Wilma F. Bergfeld, M.D., F.A.C.P.; Donald V. Belsito, M.D.; Bruce A. Brod, M.D., M.H.C.I., F.A.A.D.; Samuel M. Cohen, M.D., Ph.D.; Curtis D. Klaassen, Ph.D.; Allan E. Rettie, Ph.D.; David Ross, Ph.D.; Paul W. Snyder, D.V.M., Ph.D.; and Susan C. Tilton, Ph.D. The Cosmetic Ingredient Review (CIR) Executive Director is Bart Heldreth, Ph.D., and the Senior Director is Monice Fiume, M.B.A. This safety assessment was prepared by Litta Paulson, M.P.H., Scientific Analyst/Writer, CIR.

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SAFETY ASSESSMENT FLOW CHART

INGREDIENT/FAMILY Sodium Hydrosulfite
MEETING October 2026



COSMETIC
INGREDIENT REVIEW
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Memorandum

To: Expert Panel for Cosmetic Ingredient Safety Members and Liaisons
From: Litta Paulson, M.P.H., Scientific Analyst/Writer, CIR
Date: September 11, 2026
Subject: Safety Assessment of Sodium Hydrosulfite as Used in Cosmetics

Enclosed is the Draft Report on the Safety Assessment of Sodium Hydrosulfite as Used in Cosmetics. It is identified as *report_SodiumHydrosulfite_102026* in the pdf document. The Scientific Literature Review (SLR) was issued on July 8, 2026. This is the first time the Panel is reviewing this report.

A concentration of use survey using FDA cosmetic product categories under MoCRA was conducted; no uses of Sodium Hydrosulfite were reported (*data_SodiumHydrosulfite_102026*). No additional data have been received since the issuing of the SLR. Comments on the SLR were received from the Council (*PCPCcomments_SodiumHydrosulfite_102026*) and have been addressed (*response-PCPCcomments_SodiumHydrosulfite_102026*).

Other information included in this packet includes:

- flow chart (*flow_SodiumHydrosulfite_102026*)
- report history (*history_SodiumHydrosulfite_102026*)
- search strategy (*search_SodiumHydrosulfite_102026)*
- data profile (*dataprofile_SodiumHydrosulfite_102026)*

If no further data are needed to reach a conclusion of safety, the Panel should formulate a Discussion and issue a Tentative Report. However, if additional data are required, the Panel should be prepared to identify those needs and issue an Insufficient Data Announcement.

Sodium Hydrosulfite History

July 2026

- SLR posted
- Comments on SLR from Council received

October 2026

- Panel reviews Draft Report

Sodium Hydrosulfite Data Profile* – October 2026 – Litta Paulson																															
				Toxicokinetics			Acute Tox			Repeated Dose Tox			DART		Genotox		Carci		Dermal Irritation			Dermal Sensitization				Ocular Irritation		Clinical Studies	
	Reported Use	Method of Mfg	Impurities	log P/log K_{ow}	Dermal Penetration	ADME	Dermal	Oral	Inhalation	Dermal	Oral	Inhalation	Dermal	Oral	In Vitro	In Vivo	Dermal	Oral	In Vitro	Animal	Human	In Vitro	Animal	Human	Phototoxicity	In Vitro	Animal	Retrospective/ Multicenter	Case Reports
Sodium Hydrosulfite	**X**	**X**	X	X				X							X					X							X			

* "X" indicates that data were available in a category for the ingredient

Sodium Hydrosulfite

Ingredient	CAS #	PubMed	FDA	CompTox	ChemPort	NIOSH	NTIS	NTP	FEMA	EU	ECHA	SIDS	SCCS	AICIS	FAO	WHO	Web
Sodium Hydrosulfite	7775-14-6	X	X	X	X		X			X	X	X		X	X	X	X

Search Strategy

PubMed Search Strings:
(sodium hydrosulfite) *[153 hits / 0 useful]*
(sodium dithionite) AND (toxicity) *[94 hits / 2 useful]*

Search terms used in all links other than PubMed:
Sodium hydrosulfite
Sodium dithionite
7775-14-6

LINKS

Search Engines

- Pubmed - http://www.ncbi.nlm.nih.gov/pubmed
  - appropriate qualifiers are used as necessary
  - search results are reviewed to identify relevant documents
- CompTox: https://comptox.epa.gov/dashboard/chemical/pubmed-abstract-sifter/DTXSID3039242; https://www.epa.gov/comptox-tools/downloadable-computational-toxicology-data#LM
- eChemPortal: https://www.echemportal.org/echemportal/
- DeepDyve: https://www.deepdyve.com/
- Connected Papers - https://www.connectedpapers.com/

Pertinent Websites

- wINCI - https://incipedia.personalcarecouncil.org/winci/ingredient-custom-search/
- FDA Cosmetics page - https://www.fda.gov/cosmetics
- eCFR (Code of Federal Regulations) - https://www.ecfr.gov/
- FDA search databases: https://www.fda.gov/industry/fda-basics-industry/search-databases
- Substances Added to Food (formerly, EAFUS): https://www.fda.gov/food/food-additives-petitions/substances-added-food-formerly-eafus
- GRAS listing: https://www.fda.gov/food/food-ingredients-packaging/generally-recognized-safe-gras
- SCOGS database: https://www.fda.gov/food/generally-recognized-safe-gras/gras-substances-scogs-database
- Inventory of Food Contact Substances Listed in 21 CFR: https://www.cfsanappsexternal.fda.gov/scripts/fdcc/index.cfm?set=IndirectAdditives
- Drug Approvals and Database: https://www.fda.gov/drugs/development-approval-process-drugs/drug-approvals-and-databases
- FDA Orange Book: https://www.fda.gov/drugs/drug-approvals-and-databases/approved-drug-products-therapeutic-equivalence-evaluations-orange-book
- OTC Monographs - https://dps.fda.gov/omuf
- Inactive Ingredients Approved For Drugs: https://www.accessdata.fda.gov/scripts/cder/iig/
- FEMA (Flavor & Extract Manufacturers Association) GRAS: https://www.femaflavor.org/fema-gras
- NIOSH (National Institute for Occupational Safety and Health) - http://www.cdc.gov/niosh/
- NTIS (National Technical Information Service) - http://www.ntis.gov/
  - technical reports search page: https://ntrl.ntis.gov/NTRL/
- NTP (National Toxicology Program) - http://ntp.niehs.nih.gov/
- EUR-Lex - https://eur-lex.europa.eu/homepage.html
- Scientific Committees (SCCS, etc) opinions: https://health.ec.europa.eu/scientific-committees_en https://health.ec.europa.eu/scientific-committees/scientific-committee-consumer-safety-sccs_en
- ECHA (European Chemicals Agency – REACH dossiers) – https://echa.europa.eu/
- European Medicines Agency (EMA) - http://www.ema.europa.eu/ema/
- OECD SIDS (Organisation for Economic Co-operation and Development Screening Info Data Sets)- http://webnet.oecd.org/hpv/ui/Search.aspx
- EFSA (European Food Safety Authority) - https://www.efsa.europa.eu/en
- ECETOC (European Centre for Ecotoxicology and Toxicology of Chemicals) - http://www.ecetoc.org
- AICIS (Australian Industrial Chemicals Introduction Scheme)- https://www.industrialchemicals.gov.au/
- International Programme on Chemical Safety http://www.inchem.org/
- Office of Dietary Supplements https://ods.od.nih.gov/
- FAO (Food and Agriculture Organization of the United Nations) - http://www.fao.org/food/food-safety-quality/scientific-advice/jecfa/jecfa-additives/en/
- WHO (World Health Organization) IRIS library - https://apps.who.int/iris/
- a general Google and Google Scholar search should be performed for additional background information, to identify references that are available, and for other general information - www.google.com https://scholar.google.com/

Fragrance Websites, if applicable

- IFRA (International Fragrance Association) – https://ifrafragrance.org/
- Research Institute for Fragrance Materials (RIFM) - https://www.rifm.org/#gsc.tab=0 http://fragrancematerialsafetyresource.elsevier.com/
-

Personal Care Products Council

Memorandum

TO: Bart Heldreth, Ph.D.
Executive Director - Cosmetic Ingredient Review

FROM: Jaap Venema, Ph.D.
EVP and Chief Scientist – Personal Care Products Council
Industry Liaison to the CIR Expert Panel

DATE: July 20, 2026

SUBJECT: Scientific Literature Review: Safety Assessment of Sodium Hydrosulfite as Used in Cosmetics (release date: July 8, 2026)

The Personal Care Products Council respectfully submits the following comments on the scientific literature review, Safety Assessment of Sodium Hydrosulfite as Used in Cosmetics.

Introduction – This report should refer to the 2003 CIR report on sulfites which has a conclusion of "safe as used".

Cosmetic Use; Summary – Please state the number of uses reported in hair coloring preparations (6710).

Cosmetic Use - "Hair color sprays" would be a better example of a spray product than "Other fragrance preparations", as other fragrance preparations may not be spray products.

Toxicokinetics – This section should note that as stated in the chemistry section Sodium Hydrosulfite is not stable in the presence of water and oxygen. Any sulfur compounds that might be absorbed from use of Sodium Hydrosulfite in cosmetics are part of normal sulfur pathways in biological systems including humans. It would be helpful to note that sulfur is the third most abundant mineral in the body. For more information on sulfur pathways, the CIR report should refer the reader to reviews such as:

Parcell S. 2002. Sulfur in human nutrition and applications in medicine. Altern Med Rev 7(1):22-44.

Hansen AW and Venkatachalam KV. 2023. Sulfur-Element containing metabolic pathways in human health and crosstalk with the microbiome. Biochemistry and Biophysics Reports 35: 101529 https://doi.org/10.1016/j.bbrep.2023.101529 .

Genotoxicity – Since Sodium Hydrosulfite is primarily used in hair dye products, it would also be helpful to note that reference 12 also looked at the interaction of indigo dye and Sodium Hydrosulfite on chromosomal aberrations. The genotoxicity of Sodium Hydrosulfite was reduced by the presence of the indigo dye (experiments of the mixtures done at pH 9 and 11).

Carcinogenicity – Because Sodium Hydrosulfite degrades into other sulfur compounds, it would be useful to note that in 1992, IARC concluded that Sulfur Dioxide and Some Sulfites, Bisulfites and Metabisulfites are in Group 3 not classifiable as to their carcinogenicity to humans (see https://publications.iarc.who.int/72).

Sulfite Reactions – Because Sodium Hydrosulfite may degrade into sulfites, it may be helpful if this report mentioned sulfite adverse reactions. The following review may be useful.

Vally H and La Misso N. 2012. Adverse reactions to the sulphite additives. Gastroenterol Hepatol Bed Bench. 5(1): 16-23. https://pmc.ncbi.nlm.nih.gov/articles/PMC4017440/

Sodium Hydrosulfite – October 2026 – Litta Paulson	
Comment Submitter: Personal Care Products Council **Date of Submission: July 20, 2026**	
Comment	**Response/Action**
Introduction – This report should refer to the 2003 CIR report on sulfites which has a conclusion of "safe as used."	addressed
Cosmetic Use; Summary – Please state the number of uses reported in hair coloring preparations (6710).	addressed
Cosmetic Use - "Hair color sprays" would be a better example of a spray product than "Other fragrance preparations", as other fragrance preparations may not be spray products.	addressed
Toxicokinetics – This section should note that as stated in the chemistry section Sodium Hydrosulfite is not stable in the presence of water and oxygen. Any sulfur compounds that might be absorbed from use of Sodium Hydrosulfite in cosmetics are part of normal sulfur pathways in biological systems including humans. It would be helpful to note that sulfur is the third most abundant mineral in the body. For more information on sulfur pathways, the CIR report should refer the reader to reviews such as: Parcell S. 2002. Sulfur in human nutrition and applications in medicine. Altern Med Rev 7(1):22-44. Hansen AW and Venkatachalam KV. 2023. Sulfur-Element containing metabolic pathways in human health and crosstalk with the microbiome. Biochemistry and Biophysics Reports 35: 101529 https://doi.org/10.1016/j.bbrep.2023.101529 .	CIR staff considered this addition and ultimately decided that these general statements about sulfur compounds would not be directly relevant to this ingredient and no toxicokinetics studies/data were provided on this ingredient, in the proposed citations.
Genotoxicity – Since Sodium Hydrosulfite is primarily used in hair dye products, it would also be helpful to note that reference 12 also looked at the interaction of indigo dye and Sodium Hydrosulfite on chromosomal aberrations. The genotoxicity of Sodium Hydrosulfite was reduced by the presence of the indigo dye (experiments of the mixtures done at pH 9 and 11).	addressed
Carcinogenicity – Because Sodium Hydrosulfite degrades into other sulfur compounds, it would be useful to note that in 1992, IARC concluded that Sulfur Dioxide and Some Sulfites, Bisulfites and Metabisulfites are in Group 3 not classifiable as to their carcinogenicity to humans (see https://publications.iarc.who.int/72).	addressed
Sulfite Reactions – Because Sodium Hydrosulfite may degrade into sulfites, it may be helpful if this report mentioned sulfite adverse reactions. The following review may be useful. Vally H and La Misso N. 2012. Adverse reactions to the sulphite additives. Gastroenterol Hepatol Bed Bench. 5(1): 16-23. https://pmc.ncbi.nlm.nih.gov/articles/PMC4017440/	CIR staff considered this addition and ultimately decided, at this early draft report stage, to include safety data exclusively on this ingredient (a dithionate), and await the Panel's consideration prior to inclusion of studies on potential metabolites.

Safety Assessment of Sodium Hydrosulfite as Used in Cosmetics

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ABBREVIATIONS

CIR	Cosmetic Ingredient Review
CK-MB	creatine kinase–myocardial band
Council	Personal Care Products Council
CPK	creatine phosphokinase
Dictionary	*International Cosmetic Ingredient Dictionary*
FDA	US Food and Drug Administration
GRAS	generally recognized as safe
GSH	glutathione
IARC	International Agency for Research on Cancer
LD_{50}	median lethal dose
l.o.	leave-on
MoCRA	Modernization of Cosmetics Regulation Act of 2022
NR	not reported
OECD	Organisation for Economic Co-operation and Development
Panel	Expert Panel for Cosmetic Ingredient Safety
RLD	Registration and Listing Data
r.o.	rinse-off
ROS	reactive oxygen species
SCE	sister chromatid exchange
SCOGS	Select Committee on GRAS Substances
SIDS	Screening Information Data Set
TG	test guideline
UDS	unscheduled DNA synthesis
US	United States
WoE	weight-of-evidence

INTRODUCTION

This assessment reviews the safety of Sodium Hydrosulfite as used in cosmetic formulations. According to the *International Cosmetic Ingredient Dictionary* (*Dictionary*), this ingredient is reported to function in cosmetics as a reducing agent.[1]

The Expert Panel for Cosmetic Ingredient Safety (Panel) has previously reviewed the safety of sulfites. In the original review of sodium sulfite, potassium sulfite, ammonium sulfite, sodium bisulfite, ammonium bisulfite, sodium metabisulfite, and potassium metabisulfite that was published in 2003, the Panel concluded that these ingredients are safe as used in cosmetic formulations (as described in that report).[2] In 2023, a re-review was conducted for these ingredients; the Panel reaffirmed the original conclusion that these ingredients are safe as cosmetic ingredients in the practices of use and concentration as described in the safety assessment.[3] (These reports can be found on the CIR website (https://cir-reports.cir-safety.org/).) Although "sulfite" is part of this ingredient's name, Sodium Hydrosulfite is a dithionite, not a sulfite. However, in aqueous systems, this ingredient may be oxidized to sulfite.

This safety assessment includes relevant published and unpublished data that are available for each endpoint that is evaluated. Published data are identified by conducting an extensive search of the world's literature; a search was last conducted in August 2026. A listing of the search engines and websites that are used and the sources that are typically explored, as well as the endpoints that the Panel typically evaluates, is provided on the Cosmetic Ingredient Review (CIR) website (https://www.cir-safety.org/supplementaldoc/preliminary-search-engines-and-websites; https://www.cir-safety.org/supplementaldoc/cir-report-format-outline). Unpublished data are provided by the cosmetics industry, as well as by other interested parties.

Much of the data included in this safety assessment was cited in the Screening Information Data Set (SIDS) found on the Organisation for Economic Co-operation and Development (OECD) website.[4] Please note that the SIDS document provides summaries of information generated by industry, and it is those summary data that are reported in this safety assessment when OECD SIDS is cited.

CHEMISTRY

Definition and Structure

The *Dictionary* defines Sodium Hydrosulfite (CAS No. 7775-14-6) as the inorganic salt that conforms to the formula $Na_2S_2O_4$.[1] This ingredient has the following idealized chemical structure as shown in Figure 1. This substance is also commonly referred to as sodium dithionite and has two forms: dihydrate and anhydrous salt.[4] While "sulfite" is in this ingredient's name, the dithionite moiety is a much stronger and more aggressive reducing agent that is oxidized in two steps with sulfite as an intermediate.[5] In aqueous systems, this ingredient will be quickly oxidized to sodium hydrogen sulfite and sodium hydrogen sulfate.

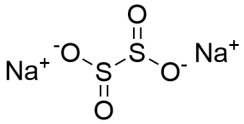


Figure 1. Sodium Hydrosulfite (anhydrous salt drawn here)

Chemical Properties

Sodium Hydrosulfite is a white to light yellow crystalline powder with a sulfur dioxide-like odor.[6,7] It has a water solubility value of 250 g/l at 20ºC, a log P_{ow} value of < -4.7, and a formula weight of 174.11 g/mol; the melting point for this ingredient is 52ºC (decomposes).[7,8] It is not chemically stable in the presence of water and oxygen; when dissolved in water, sodium hydrogen sulfite, sodium hydrogen sulfate and sodium thiosulfate are formed, and when exposed to air, sodium sulfite and sodium sulfate are formed.[4] In strongly acidic conditions, Sodium Hydrosulfite may release sulfur dioxide. The anhydrous salt undergoes exothermic decomposition upon heating (≥ 90°C in air and ≥ 150°C without air), producing mainly sodium sulfite, sodium thiosulfate, sodium sulfate, and sulfur dioxide. Additional chemical properties are found in Table 1.

Method of Manufacture

Most of the methods below are general to the processing of Sodium Hydrosulfite, but it is unknown if they apply to cosmetic ingredient manufacturing.

The processes used to produce Sodium Hydrosulfite include zinc-dust, amalgam, formate, sodium borohydride, and electrochemical processes.[4] All manufacturing methods begin with the reduction of sulfurous acid (free form (SO_2) or hydrogen sulfite (HSO_3^-)). In the zinc-dust process, zinc dithionite is produced by reacting zinc dust with sulfur dioxide, followed by filtration to remove impurities, and cation exchange and precipitation of zinc with sodium carbonate or sodium hydroxide. Finally, anhydrous Sodium Hydrosulfite is isolated by vacuum concentration, addition of sodium chloride, filtration, washing with methanol, and drying. In the amalgam process, sodium hydrogen sulfite is reduced to Sodium Hydrosulfite in an aqueous solution within a cooled, stirred reactor using sodium amalgam from a chloralkali electrolysis cell. In the formate process, Sodium Hydrosulfite is produced by reacting sodium formate with sulfur dioxide and sodium

hydroxide in 80% methanol at a controlled pH of 4 - 5, leading to precipitation of anhydrous Sodium Hydrosulfite crystals. The product is then filtered, washed with methanol, and dried. In the sodium borohydride process, Sodium Hydrosulfite is produced by reacting sodium borohydride with sulfur dioxide and sodium hydroxide in a strong alkaline solution, forming sodium metaborate and water as byproducts. The electrochemical process uses electric current as the reducing agent to produce Sodium Hydrosulfite (no further details provided).

Impurities

Specific impurities data were not found in the published literature, and unpublished data were not submitted. The OECD SIDS report stated that the Sodium Hydrosulfite that was assessed had a purity of > 88% w/w, with impurities of disodium disulfite (1 – 5% w/w), sodium sulfite (1 – 5% w/w), and sodium thiosulfate (0 – 2% w/w).[4]

USE

Cosmetic

The safety of the cosmetic ingredient addressed in this assessment is evaluated based on data received from the US Food and Drug Administration (FDA) and the cosmetics industry on the expected use of Sodium Hydrosulfite in cosmetics. Registration and Listing Data (RLD) obtained from the FDA report frequency of use, and responses to a survey conducted by the Personal Care Products Council (Council) indicate maximum reported concentrations of use; it is these values that define the present practices of use and concentration that are assessed by the Panel. Since 2024, as a result of the Modernization of Cosmetics Regulation Act of 2022 (MoCRA), manufacturers and processors are required to register facilities and list their products (and ingredients therein) with the FDA (i.e., RLD). An exception is made for small businesses (average gross annual sales in the US of cosmetic products for the previous 3-yr period is less than $1,000,000, adjusted for inflation), which are exempt from MoCRA reporting for most cosmetic product categories. Eye area products, injected products, internal use products, or products that alter appearance for more than 24 h, and the facilities that manufacture these products, are not included in this exemption.[9] Another change resulting from MoCRA is the addition of tattoo preparations (permanent tattoo inks, temporary tattoo inks, and other tattoo products) to the product categories for which companies need to list their products with FDA. However, evaluating the safety of ingredients as used in tattoo preparations is not within the purview of the Panel; accordingly, such use is not included as part of the present practices of use that are assessed by the Panel.

According to RLD obtained from the FDA in 2025, Sodium Hydrosulfite is reported to be used in 6818 formulations; 6710 reported uses are in hair coloring preparations (Table 2).[10,11] A concentration of use survey was conducted by the Council in 2025; however, no concentrations of use for Sodium Hydrosulfite were reported.[12]

Sodium Hydrosulfite may be used near the eye area (e.g., eyelash and eyebrow preparations) or result in mucous membrane exposure (e.g., bath soaps and body washes). This ingredient is also reported to be used in baby products (e.g., baby shampoos). Cosmetic products containing Sodium Hydrosulfite may be incidentally inhaled as they are used in spray formulations (e.g., hair color sprays). In practice, as stated in the Panel's respiratory exposure resource document (https://www.cir-safety.org/cir-findings), most droplets/particles incidentally inhaled from cosmetic sprays would be deposited in the nasopharyngeal and tracheobronchial regions and would not be respirable (i.e., they would not enter the lungs) to any appreciable amount.

Following the passage of MoCRA, the FDA created a number of new product categories including, "(17) Other preparations (i.e., those preparations that do not fit another category)" (Category 17). CIR and the Panel utilize these product categories to inform, in part, the weight-of-evidence (WoE) in exposure and risk analyses. However, citation of Category 17, alone, as the product use category is uninformative. When a product is co-categorized with both Category 17 and one or more common product use categories (e.g., eye makeup preparations), or other information in the RLD such as the product name are indicative of use type (e.g., "lip balm" is part of the product name), then those uses are accounted for and may be considered to be part of the "the present practices of use" for those products; as such, the Panel's safety conclusion may be inclusive thereon. Conversely, for instances wherein the use of an ingredient in a cosmetic product is only categorized as Category 17 and other information in the RLD is not indicative of use type, the present practices of use for these products remain unknown and the Panel's safety assessment conclusion, therefore, does not apply thereon.

It is possible that some products containing Sodium Hydrosulfite may be marketed for use with airbrush delivery systems. With the advent of MoCRA and the current product categories outlined therein, it is now mandatory that cosmetic products used in airbrush delivery systems be reported as such for some, but not all, product categories in the RLD. In other words, a reliable source of frequency of use data regarding the use of cosmetic ingredients in conjunction with airbrush delivery systems is now available, in some instances. None of the reported product categories for this ingredient as listed in the RLD include a designation using airbrush application, so it is possible that this ingredient is used with airbrush delivery systems, but not reported as such. Additionally, the concentration of use surveys are conducted based on product categories as stated in the RLD, but airbrush use was not reported in response to the survey. No consumer habits and practices data or particle size data are publicly available to evaluate the exposure associated with airbrush technology, thereby preempting the ability to evaluate risk or safety. Without information regarding the consumer habits and practices data or product particle size data (or other relevant particle data, e.g., diameter) related to this use technology, the data profile is incomplete, and the

Panel is not able to determine safety for use in airbrush formulations. If this ingredient was to be used in airbrush formulations, the data are insufficient to evaluate the exposure resulting from cosmetics applied in such a manner.

Sodium Hydrosulfite is not restricted from use in any way under the rules governing cosmetic products in the European Union.[13] The International Agency for Research on Cancer (IARC) concluded in 1992 that sulfur dioxide, sulfites, bisulfites, and metabisulfites are Group 3 carcinogens and therefore not classifiable as to their carcinogenicity to humans.[14]

Non-Cosmetic

Sodium Hydrosulfite may come into contact with and migrate into food indirectly as it is used in the production of textile fibers, paper, and paperboard materials that are used for food packaging. In the U.S., Sodium Hydrosulfite is generally recognized as safe (GRAS) as a substance migrating to food from paper and paperboard products (21 CFR 182.90) and is not considered to be hazardous to the public at current levels, according to the Select Committee on GRAS Substances (SCOGS).[15] Additionally, Sodium Hydrosulfite is approved as an adjuvant substance employed in the production of textiles or textile fibers that may safely be used as articles or components of articles intended for use in producing, manufacturing, packing, processing, preparing, treating, packaging, transporting, or holding food (21 CFR 177.2800).

In several European countries, Sodium Hydrosulfite has been used in industrial applications as a reducing agent.[4] It is used for bleaching textiles, pulp, paper, and kaolin clay; it has also been used in household cleaning products. A study conducted in dogs that were poisoned with arsenic and then orally given Sodium Hydrosulfite (doses of 100 mg/kg bw) reported that Sodium Hydrosulfite could be a possible treatment for arsenic poisoning.[16]

TOXICOKINETIC STUDIES

Toxicokinetic studies on Sodium Hydrosulfite were not found in the published literature, and unpublished data were not submitted.

TOXICOLOGICAL STUDIES

Acute Toxicity Studies

Oral

In an acute oral toxicity assay performed according to OECD test guideline (TG) 401, rats (strain not stated; 10/sex/group) were administered Sodium Hydrosulfite (88% purity; suspended in aqueous carboxymethylcellulose) by gavage at doses of 200, 1600, 2000, 2500, 3200, and 6400 mg/kg bw.[4] The median lethal dose (LD_{50}) was determined to be 2500 mg/kg bw. Clinical signs such as atony, dyspnea, and diarrhea were observed in dose groups of 2000 - 6400 mg/kg bw; congestive hyperemia, cardiac dilation, gastric dilation with bloody ulcers, and diarrheic intestinal content were observed in dose groups of 2500 - 6400 mg/kg bw. There were several mortalities observed in the 2500 (3 males, 2 females), 3200 (4 males, 5 females), and 6400 mg/kg bw (5 males, 5 females) dose groups.

DEVELOPMENTAL AND REPRODUCTIVE TOXICITY STUDIES

Developmental and reproductive toxicity studies on Sodium Hydrosulfite were not found in the published literature, and unpublished data were not submitted.

GENOTOXICITY STUDIES

Some genotoxicity assays are no longer considered appropriate as standard methods for evaluating genotoxic potential under current OECD guidance. (See https://www.cir-safety.org/sites/default/files/Genotoxicity_ResourceDocument_062026.pdf for the identification of such study types.) Although these assays may be reported in the published literature, unpublished reports, or data submissions, the results from these assays (as identified in the guidance) are of limited interpretability and therefore, the studies are not summarized herein.[17]

Details regarding the genotoxicity studies summarized herein are found in Table 3. Sodium Hydrosulfite did not produce genetic mutations. Ames assays conducted with Sodium Hydrosulfite (89.5% purity; 20 - 5000 µg/plate) and another Sodium Hydrosulfite (89.1% purity; 5 - 5000 µg/plate), with and without metabolic activation, both gave negative results.[4,18] Sodium Hydrosulfite did produce chromosomal damage. A chromosomal aberration assay performed in human peripheral blood lymphocytes treated with Sodium Hydrosulfite (5000 µg/ml) resulted in significant genotoxic effects.[17] Within the same study, human peripheral blood lymphocytes were treated with *Isatis tinctoria* subsp. *tomentella* dye solution (80 µl) and Sodium Hydrosulfite (2500 – 10,000 µg/ml), resulting in significant dose-dependent genotoxic effects.

CARCINOGENICITY STUDIES

Carcinogenicity studies on Sodium Hydrosulfite were not found in the published literature, and unpublished data were not submitted.

OTHER RELEVANT STUDIES

Cardiac Mitochondrial Toxicity

In a cardiac mitochondrial toxicity study, Sodium Hydrosulfite (≥ 87% purity) was administered by gavage to male albino mice (8/group) at doses of 0, 10, 20, 50 and 100 mg/kg in saline for 45 d.[19] Mitochondrial function in mice heart tissues significantly decreased in all treated groups when compared to the control. Reactive oxygen species (ROS) formation, malondialdehyde levels, and protein carbonyl levels significantly increased in the higher dose groups, when compared to the control; catalase activity and mitochondrial glutathione (GSH) decreased. Serum levels of creatine phosphokinase (CPK), creatine kinase–myocardial band (CK-MB), and Troponin I in mice heart mitochondria dose-dependently increased in all treated groups, when compared to the control.

DERMAL IRRITATION AND SENSITIZATION STUDIES

Irritation

Animal

White Vienna rabbits (2 total) were treated with an 80% aqueous preparation of Sodium Hydrosulfite (88% purity) in a 20-h occlusive skin irritation assay; the skin was rinsed following patch removal.[4] The application site was 2.5 cm^2. Mild erythema was observed 24h post treatment but resolved after 8 d. The test substance was slightly irritating but did not meet the criteria to be classified as a skin irritant. In an additional 2 animals that were treated for 1, 5, and 15 min, no irritation was observed.

Sensitization

Sensitization studies on Sodium Hydrosulfite were not found in the published literature, and unpublished data were not submitted.

OCULAR IRRITATION STUDIES

Animal

In accordance with OECD TG 405, Sodium Hydrosulfite (88% purity; 97 mg applied as a fine powder without a vehicle) was instilled into the conjunctival sac of 3 rabbits (strain not stated); the eyes were rinsed after 1 h.[4] Moderate to severe erythema and slight edema were observed in all treated animals following the 1-h exposure, persisting for 72 and 48 h, respectively; no changes were seen in the cornea or iris. All effects were resolved after 7 d in all animals except 1 (which continued to display slight redness of the conjunctiva). The test substance was found to be irritating.

White Vienna rabbits (n = 2) were treated with Sodium Hydrosulfite (88% purity; tested undiluted; 0.05 ml bulk volume applied as solid material without a vehicle) in a 24-h eye irritation assay.[4] After the treatment period, slight corneal opacity, slight or marked iritis, slight conjunctival redness, and slight or marked conjunctival edema were observed; some necrosis and scar formation were also seen. These effects did not resolve after the 8-d observation period. The test substance was classified as a severe eye irritant.

SUMMARY

The safety of Sodium Hydrosulfite as used in cosmetic formulations is reviewed in this safety assessment. According to the *Dictionary*, this ingredient is reported to function in cosmetics as a reducing agent.

According to RLD obtained from the FDA in 2025, Sodium Hydrosulfite is reported to be used in 6818 formulations. A concentration of use survey was conducted by the Council in 2025; no concentrations of use for Sodium Hydrosulfite were reported.

In an acute oral toxicity assay conducted in rats administered Sodium Hydrosulfite (88% purity; up to 6400 mg/kg bw), an LD_{50} of 2500 mg/kg bw was determined. Some mortality and dose-dependent signs of toxicity were observed in the higher-dose groups.

Sodium Hydrosulfite (89.1 – 89.5% purity; up to 5000 µg/plate) was not mutagenic in Ames assays conducted with and without metabolic activation. However, in chromosomal aberration assays, significant genotoxicity was observed in human peripheral blood lymphocytes treated with Sodium Hydrosulfite (up to 10,000 µg/ml; with and without *Isatis tinctoria* subsp. *tomentella* dye solution).

Sodium Hydrosulfite (≥ 87% purity; up to 100 mg/kg) was administered to male albino mice in a 45-d cardiac mitochondrial toxicity study. Impaired cardiac mitochondrial function was observed in all treated groups; increased oxidative stress and cardiac damage markers were seen in the higher dose groups in a dose-dependent manner.

In a 20-h occlusive skin irritation assay, white Vienna rabbits treated with an 80% aqueous preparation of Sodium Hydrosulfite displayed mild erythema at 24 h. The observed effects were resolved after 8 d; no irritation was observed in 2 animals treated for 1 – 15 min. The test substance was slightly irritating but was not classified as a skin irritant.

In a 1-h eye irritation study, Sodium Hydrosulfite (88% purity; 97 mg applied as a fine powder without a vehicle) was instilled into the conjunctival sac of rabbits, resulting in moderate to severe erythema and slight edema, with no effects on the cornea or iris. Although these effects were resolved within 7 d in most animals, 1 showed continued conjunctival redness; the substance was found to be irritating. In a 24-h eye irritation study, white Vienna rabbits were treated with Sodium Hydrosulfite (88% purity; tested undiluted; 0.05 ml bulk volume applied as solid material without a vehicle). Corneal opacity, iritis, conjunctival redness, edema, and evidence of necrosis and scarring were observed; these effects did not resolve after 8 d. The test substance was classified as a severe eye irritant.

DISCUSSION

To be developed.

CONCLUSION

To be determined.

TABLES

Table 1. Chemical properties

Property	Value	Reference
Physical Form	Crystalline powder, solid	6,7
Color	White to light yellow	6,7
Odor	Sulfur dioxide-like odor	6
Formula Weight (g/mol)	174.11	6,7
Density (g/ml)	2.4	6,7,20
Melting Point (ºC)	52 (decomposes)	8
Water Solubility (g/l @ 20ºC)	250	7
log P_{ow}	< -4.7	7

Table 2. Frequency and concentration of use of Sodium Hydrosulfite according to likely duration and exposure and by product category

	# of Uses	Max Conc of Use
	RLD (2025)[10,11]	% (2025)[12]
Totals*	**6818**	**NR**
summarized by likely duration and exposure**		
Duration of Use		
Leave-On	*193*	*NR*
Rinse-Off	*6770*	*NR*
Diluted for (Bath) Use	*67*	*NR*
Unknown	*2*	*NR*
Exposure Type		*NR*
Baby Products	1	*NR*
Children's Makeup	NR	*NR*
Eye Area	65	*NR*
Incidental Ingestion	NR	*NR*
Mucous Membrane	200	*NR*
Incidental Inhalation-Spray	4; 248[a]; 136[b]	*NR*
Incidental Inhalation-Airbrush	NR	*NR*
Incidental Inhalation-Powder	136[b]	*NR*
Dermal Contact	279	*NR*
Deodorant (underarm)	NR	*NR*
Hair - Non-Coloring	52	*NR*
Hair-Coloring	6710	*NR*
Nail	NR	*NR*
Other Preparations (Unknown Exposure Type)	2	*NR*
as reported by product category		
Baby Products		
Baby Shampoos	1	NR
Bath Preparations		
Bath Oils, Tablets, and Salts	2	NR
Bubble Baths	1	NR
Other Bath Preparations	64	NR
Eye Makeup Preparations (other than children's eye makeup preparations)		
Eyebrow Pencil	1	NR
Eyeliner	3	NR
Eyelash and Eyebrow Adhesives, Glues, and Sealants	6	NR
Eyelash and Eyebrow Preparations (primers, conditioners, serums, fortifiers)	21	NR
Other Eye Makeup Preparations	10	NR
Fragrance Preparations		
Other Fragrance Preparation	3	NR
Hair Preparations (non-coloring)		
Hair Conditioners	2 (l.o.)	NR
Hair Straighteners	3	NR
Permanent Waves	6	NR
Rinses (non-coloring)	2	NR
Shampoos (non-coloring)	10 (r.o.)	NR
Tonics, Dressings, and Other Hair Grooming Aids	3	NR
Wave Sets	1	NR
Other Hair Preparations	2 (l.o.); 22 (r.o.)	NR
Hair Coloring Preparations		
Hair Dyes and Colors (all types requiring caution statements and patch tests)	5589	NR
Hair Tints	684	NR
Hair Rinses (coloring)	25 (r.o.)	NR

Table 2. Frequency and concentration of use of Sodium Hydrosulfite according to likely duration and exposure and by product category

	# of Uses	Max Conc of Use
	RLD (2025)[10,11]	% (2025)[12]
Hair Shampoos (coloring)	1 (l.o.); 40 (r.o.)	NR
Hair Color Sprays (aerosol)	1	NR
Hair Lighteners with Color	12	NR
Hair Bleaches	4	NR
Eyelash and Eyebrow Dyes	24	NR
Other Hair Coloring Preparation	129 (l.o.); 201 (r.o.)	NR
Personal Cleanliness		
Bath Soaps and Body Washes	126	NR
Other Personal Cleanliness Products	7 (r.o.)	NR
Skin Care Preparations (creams, lotions, powder, and sprays)		
Cleansing (cold creams, cleansing lotions, liquids, and pads)	6	NR
Face and Neck (excluding shaving preparations)	3 (r.o.)	NR
Body and Hand (excluding shaving preparations)	13 (r.o.)	NR
Moisturizing	6	NR
Night	1	NR
Other Skin Care Preparations	2 (l.o.); 2 (r.o.)	NR
Suntan Preparations		
Indoor Tanning Preparations	2	NR
Other Preparations (i.e., those preparations that do not fit another category)	2	NR

NR – not reported
l.o. – leave-on; r.o. – rinse-off
*The sum of the counts given for duration of use and by exposure type, and the sum of the frequency reported by product category, may not equal the sum of total uses because each ingredient may be used in cosmetic formulations that are reported under more than one product category.
**Likely duration and exposure are derived from survey data based on product category (see Use Categorization https://www.cir-safety.org/cir-findings)
[a] It is possible these products are sprays, but it is not specified whether the reported uses are sprays.
[b] Not specified whether a spray or a powder, but it is possible the use can be as a spray or a powder, therefore the information is captured in both categories

Table 3. Genotoxicity studies

Test Article	Vehicle	Concentration/Dose	Test System	Protocol	Results	Reference
IN VITRO						
Gene Mutation						
Sodium Hydrosulfite (89.5% purity)	distilled water	0, 20, 100, 500, 2500, and 5000 µg/plate	*Salmonella typhimurium* TA1535, TA100, TA98, TA1537 (3 plates/dose)	OECD TG 471; Ames assay; with and without metabolic activation; appropriate positive controls used	Negative; controls gave expected results	4
Sodium Hydrosulfite (89.1% purity)	distilled water	0, 5, 10, 50, 100, 500, 1000, and 5000 µg/plate	*S. typhimurium* TA1535, TA100, TA98, TA1537, TA1538, and *Escherichia coli* WP2*uvr*A	OECD TG 471 and 472; Ames assay; with and without metabolic activation; appropriate positive controls used	Negative; controls gave expected results	4,18
Chromosomal Damage						
Sodium Hydrosulfite	NR	5000 µg/ml	human peripheral blood lymphocytes (6 donors)	Chromosomal aberration assay; appropriate negative and positive controls used	Genotoxic; significant chromosomal aberrations observed, mainly chromatid breaks	17
Sodium Hydrosulfite and *Isatis tinctoria* subsp. *tomentella* dye solution (indigo dye solution; pH 9 and 11)	NR	Sodium Hydrosulfite: 2500, 5000, and 10,000 µg/ml Indigo dye solution: 80 µl	human peripheral blood lymphocytes (6 donors)	Chromosomal aberration assay; cells were treated with indigo dye solution and different concentrations of Sodium Hydrosulfite; appropriate negative and positive controls used	Genotoxic; significant dose-dependent chromosomal aberrations and abnormal cells observed; chromatid and chromosome breaks observed at higher doses	17

NR = not reported; OECD = Organisation for Economic Co-operation and Development; TG = test guideline

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Personal Care Products Council
Committed to Safety, Quality & Innovation

Memorandum

TO: Bart Heldreth, Ph.D.
Executive Director - Cosmetic Ingredient Review

FROM: Carol Eisenmann, Ph.D.
Personal Care Products Council (PCPC)

DATE: March 31, 2025

SUBJECT: Concentration of Use by FDA Product Category: Sodium Hydrosulfite

Sodium Hydrosulfite was included in the January 2025 PCPC concentration of use survey. No uses of Sodium Hydrosulfite were reported