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Safety Assessment of Glycerin Ethoxylates as Used in Cosmetics

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Abstract

The Expert Panel for Cosmetic Ingredient Safety (Panel) assessed the safety of 8 glycerin ethoxylates, as used in cosmetic formulations. All of these ingredients are reported to function in cosmetics as skin-conditioning agents, and most are also reported to function as viscosity-decreasing agents. The Panel reviewed relevant data relating to the safety of these ingredients. The Panel concluded that these ingredients are safe in cosmetics in the present practices of use and concentration as described in this safety assessment when formulated to be non-irritating.

Keywords

Cosmetic Ingredient Review, Expert Panel for Cosmetic Ingredient Safety, Safety, Cosmetics, Glycerin Ethoxylates, Glycereth-3, Glycereth-7, Glycereth-8, Glycereth-12, Glycereth-18, Glycereth-20, Glycereth-26, Glycereth-31

Introduction

This is a safety assessment of the following 8 glycerin ethoxylates as used in cosmetic formulations:

Glycereth-3	Glycereth-18
Glycereth-7	Glycereth-20
Glycereth-8	Glycereth-20
Glycereth-12	Glycereth-31

According to the web-based *International Cosmetic Ingredient Dictionary and Handbook* (*Dictionary*), all of these ingredients are reported to function in cosmetics as skin-conditioning agents, and most are reported to function as viscosity decreasing agents (Table 1).[1]

The rationale for this grouping of ingredients stems from the fact that these ingredients are structurally-related as polyethylene glycol ethers of glycerin. The Expert Panel for Cosmetic Ingredient Safety (Panel) has reviewed the safety of other similar, structurally-related families of ingredients. In 2010, the Panel issued a final report on the safety of polyethylene glycols (PEGs); the Panel concluded that the PEGs are safe in the present practices of use and concentration.[2] In 2015, the Panel issued a safety assessment on glycerin, with the conclusion that glycerin was safe as a cosmetic ingredient in the practices of use and concentration described in the safety assessment.[3] Additionally, the Panel has issued safety assessments of structurally-related polyethoxylated compounds, such as alkyl PEG ethers and PEGs cocamine, in which it was concluded that these ingredients are safe in the present practices of use and concentration.[4,5] These reports are available on the Cosmetic Ingredient Review (CIR) website (https://www.cir-safety.org/ingredients).

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 exhaustive search of the world's literature. 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 CIR website (https://www.cir-safety.org/supplementaldoc/preliminary-search-engines-and-websites; https://www.cir-safety.org/supplementaldoc/cir-report-format-outline). Unpublished

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Table 1. Definitions and Functions of the Ingredients in This Safety Assessment.[1, CIR Staff]

Ingredient CAS No.	Definition	Function(s)
Glycereth-3 31694-55-0 (generic)	Glycereth-3 is the polyethylene glycol ether of glycerin with an average ethoxylation value of 3. [The chemical structure of this ingredient conforms to that of Figure 1, wherein x + y + z = 3.]	Skin-Conditioning Agents—Emollient; Surfactants—Cleansing Agents; Surfactants—Emulsifying Agents
Glycereth-7 31694-55-0 (generic)	Glycereth-7 is the polyethylene glycol ether of glycerin with an average ethoxylation value of 7. [The chemical structure of this ingredient conforms to that of Figure 1, wherein x + y + z = 7.]	Skin-Conditioning Agents—Humectant; Viscosity Decreasing Agents
Glycereth-8 31694-55-0 (generic)	Glycereth-8 is the polyethylene glycol ether of glycerin with an average ethoxylation value of 8. [The chemical structure of this ingredient conforms to that of Figure 1, wherein x + y + z = 8.]	Skin-Conditioning Agents—Emollient; Skin-Conditioning Agents—Humectant; Viscosity Decreasing Agents
Glycereth-12 31694-55-0 (generic)	Glycereth-12 is the polyethylene glycol ether of glycerin with an average ethoxylation value of 12. [The chemical structure of this ingredient conforms to that of Figure 1, wherein x + y + z = 12.]	Skin-Conditioning Agents—Humectant; Viscosity Decreasing Agents
Glycereth-18 31694-55-0 (generic)	Glycereth-18 is a polyethylene glycol ether of glycerin containing an average of 18 moles of ethylene oxide. [The chemical structure of this ingredient conforms to that of Figure 1, wherein x + y + z = 18.]	Skin-Conditioning Agents—Humectant
Glycereth-20 31694-55-0 (generic)	Glycereth-20 is the polyethylene glycol ether of glycerin with an average ethoxylation value of 20. [The chemical structure of this ingredient conforms to that of Figure 1, wherein x + y + z = 20.]	Skin-Conditioning Agents—Humectant; Viscosity Decreasing Agents
Glycereth-26 31694-55-0 (generic)	Glycereth-26 is the polyethylene glycol ether of glycerin with an average ethoxylation value of 26. [The chemical structure of this ingredient conforms to that of Figure 1, wherein x + y + z = 26.]	Skin-Conditioning Agents—Humectant; Viscosity Decreasing Agents
Glycereth-31 31694-55-0 (generic)	Glycereth-31 is the polyethylene glycol ether of glycerin with an average ethoxylation value of 31. [The chemical structure of this ingredient conforms to that of Figure 1, wherein x + y + z = 31.]	Skin-Conditioning Agents—Humectant; Viscosity Decreasing Agents

data are provided by the cosmetics industry, as well as by other interested parties.

Much of the data included in this safety assessment was found on the European Chemicals Agency (ECHA) website.[6] Please note that the ECHA website provides summaries of information generated by industry, and it is those summary data that are reported in this safety assessment when ECHA is cited. The ECHA dossier was prepared for ingredients with the generic CAS No. 31694-55-0 (identified as glycerol, ethoxylated in the dossier), but the specific identities of the ingredients were not discerned; the identification of the test article in each study was provided as a trade name, and those trade names were not found in the *Dictionary*. However, because these data were included as part of the ECHA dossier on ethoxylated glycerols, they are included in this safety assessment as potential read-across. Additionally, data for a read-across chemical analog of ethoxylated glycerols, propoxylated glycerol, is included, when appropriate. If it is known that a test substance is a cosmetic ingredient, then the International Nomenclature Cosmetic Ingredient (INCI) name is used; otherwise, a generic term that identifies that test substance (e.g., ethoxylated glycerol) is used.

Chemistry

Definition and Structure

These ingredients are polyethylene glycol ethers of glycerin, as depicted in Figure 1.

The definition of each ingredient, as given in the *Dictionary*, is provided in Table 1. This group of ethoxylated glycerin ingredients is identified by the generic CAS No. 31694-55-0.[1] For the data summarized herein as ethoxylated glycerol, the ECHA dossier describes the average ethoxylation value as between 1 and 6.5, inclusive of 1 and 6.5. Thus, the average ethoxylation value for ethoxylated glycerol may be described as $1.0 \leq x + y + z \leq 6.5$ for the test material evaluated in those summaries. While ethoxylated glycerin is not precisely defined as a cosmetic ingredient, comparing this range of average ethoxylation values to those of the ingredients in this report, Glycereth-3 (i.e., $x + y + z = 3$) falls in that range. Accordingly, structurally, ethoxylated glycerol is a suitable candidate for a read-across source to these ingredients, especially Glycereth-3. Justifications for the use of ethoxylated glycerol and propoxylated glycerol as read-across sources are provided in Table 2, and such use is described in the body of the report.

Chemical Properties

Ethoxylated glycerin is a non-volatile (vapor pressure 0.0000389 hPa at 20°C), slightly viscous liquid at room temperature, and it is fully miscible with water.[6] Physical and chemical properties of the glycerin ethoxylate ingredients included in the report are presented in Table 3.

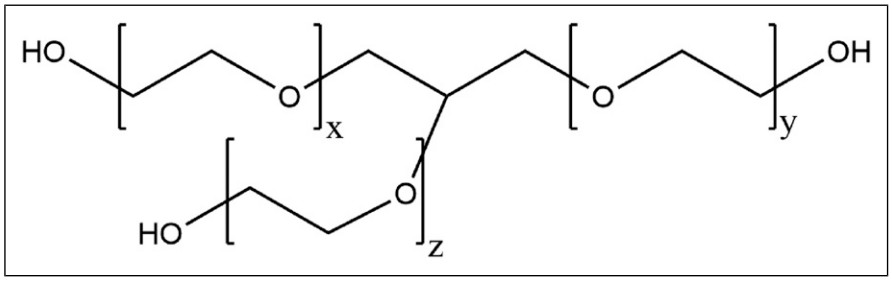
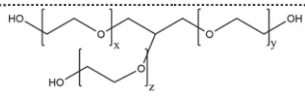
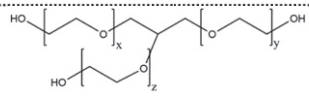
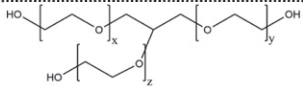
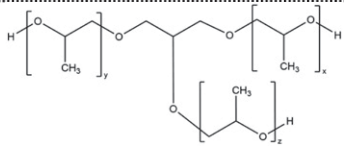


Figure 1. Glycerin ethoxylates, wherein the average ethoxylation value equals x + y + z (e.g., x + y + z = 3 in the case of Glycereth-3).

Table 2. Read Across Justification.

	Target Ingredient(s)	Read-Across Source
Name	***Short-chain glycerin ethoxylate ingredients, especially Glycereth-3***[28] *(estimated)*	*Ethoxylated glycerol*[6]
CAS No.	31694-55-0	31694-55-0
Structure		
Chemical properties		
Molecular Weight (g/mol)	224.25	136.15 – 379.81
Physical form		Clear liquid
Specific gravity (@ 20ºC)		1.163
Viscosity (mPa·s @ 20 ºC)		399
Vapor pressure (Pa @ 20ºC)	0.000006	0.0000389
Melting Point (ºC)	117.54	-49.1
Boiling Point (ºC)	366.31	260
Water Solubility (g/l @ 20ºC)	1000	1000
log P (estimated)	-3.07	-2.26 – -1.48
Read-across endpoints		• acute toxicity; dermal, oral; inhalation • genotoxicity; in vitro • dermal irritation; in vitro • ocular irritation; in vitro, animal
Justification	mixture of compounds similar to glycerin ethoxylates; molecules are predicted to have similar absorption, distribution, metabolism and chemical reactivity to glycerin ethoxylates and these compounds are expected to have similar toxicological profiles	
Name	***Glycerin ethoxylate ingredients***	*Propoxylated glycerol*[6]
CAS No.	31694-55-0	31694-55-0
Structure		
Read-across endpoints		• genotoxicity; in vitro • dermal sensitization; animal
Justification	similar small core structure modified with propoxyl groups; molecules are predicted to have similar absorption, distribution, metabolism, chemical reactivity, and toxicological profiles	

Method of Manufacture

These ingredients, in general, are the products resulting from the reaction of glycerin and ethylene oxide.[12] Glycerin ethoxylates belong to the chemical class of alkoxylated alcohols which are also polyether alcohols (specifically, polyethylene glycol ethers of glycerin). Polyether alcohols are often formed from the reaction of an alcohol with an alkylene oxide, such as ethylene or propylene oxide.[1] Since the ether formed from the reaction of one molecule of an alcohol with one molecule of the alkylene oxide is also an alcohol, the reaction with the alkylene oxide can continue until the latter is consumed.

Table 3. Chemical Properties.

Property	Value	Reference
	Glycereth-3	
Molecular Weight (g/mol)	224.25	7
log P	-1.79 (estimated); -3.07 (estimated)	7,8
	Glycereth-7	
Physical Form	Yellow to amber color, mild odor	9
Molecular Weight (g/mol)	400.47	7
log P	-2.42 (estimated)	8
	Glycereth-8	
Molecular Weight (g/mol)	444.52	7
log P	-2.57 (estimated)	8
	Glycereth-12	
Molecular Weight (g/mol)	620.73	7
log P	-3.19 (estimated)	8
	Glycereth-18	
Molecular Weight (g/mol)	885.05	7
log K_{ow}	-7.19 (estimated)	8
	Glycereth-20	
Molecular Weight (g/mol)	972.57	7
log K_{ow}	-7.73 (estimated)	8
	Glycereth-26	
Physical Form	Yellow to amber color, mild odor	10
Molecular Weight (g/mol)	1237.47	7
log K_{ow}	-9.38 (estimated)	8
Acid value (mg KOH/g)	0.2	11
Hydroxyl value (mg KOH/g)	133.40	11
Ash content (following pyrolyzation)	0.04%	11
Specific gravity (at 25°C)	1.134	11
Dissociates in water (at pH, in 5% aq solution)	6.6	11
	Glycereth-31	
Molecular Weight (g/mol)	1457.74	7
log K_{ow}	-10.75 (estimated)	8

Alkaline catalysis is a common method of manufacturing ethoxylated glycerols, as seen in the manufacturing of alkyl PEG ethers.[4] The initiation of the alkaline catalyzed synthesis of ethoxylated glycerin consists of the addition of an alkoxide, such as ethylene oxide, to a dry solution of the appropriate alcohol (e.g., glycerin). The reaction continues to propagate (i.e., continues to add additional units of ethylene oxide to the alcohol) until the available ethylene oxide is consumed or the reaction is terminated by the addition of an acid. The finishing step consists of adding one or more oxidizing agents (e.g., hydrogen peroxide) or antioxidants/stabilizers (e.g., butylated hydroxytoluene or α-tocopherol).

Impurities

A previous Panel safety assessment of the chemically similar alkyl PEG ethers confirms that 1,4-dioxane and ethylene oxide can be present as reaction by-products.[4]

Glycereth-26. In a certificate of analysis provided by a manufacturer, it was noted that Glycereth-26 contained <0.0005% 1,4-dioxane, <0.0001% ethylene oxide, 0% free glycerin, and 0.05% water.[11]

Use

Cosmetic

The safety of the cosmetic ingredients 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 these ingredients in cosmetics. Use frequencies of individual ingredients in cosmetics are collected from manufacturers and reported by cosmetic product category in the FDA Voluntary Cosmetic Registration Program (VCRP) database. Use concentration data are submitted by the cosmetic industry in response to a survey, conducted by the Personal Care Products Council (Council), of maximum reported use concentrations by product category.

These ingredients are used in a variety of rinse-off and leave-on cosmetics products. According to 2020 VCRP survey data, Glycereth-26 is reported to be used in 437 formulations,

and Glycereth-7 is reported to be used in 80 formulations (Table 4).[13] The three other in-use ingredients are reported to be used in 21 formulations or less. The results of the concentration of use survey conducted by the Council in 2018, and updated in 2019, indicate Glycereth-26 has the highest maximum concentration of use, at 39.5% in skin cleansing products.[14] The highest concentration of use reported for products resulting in leave-on dermal exposure is 6% Glycereth-26 in eye lotion formulations.

Uses were reported in the VCRP for Glycereth-20, but no concentration of use was reported for this ingredient in response to the industry survey. The three ingredients not reported to be in use by both the VCRP and industry survey are Glycereth-3, -8, and -31.

A few of the glycerin ethoxylate ingredients are reported to be used in products that may be incidentally ingested or come into contact with mucous membranes; for example, Glycereth-7 is reported to be in 67 lipstick formulations (concentration of use data were not reported for this category) and Glycereth-18 is reported to be used in bath soaps and detergents at a maximum concentration of 0.3%. Additionally, these

Table 4. Frequency (2020)[13] and Concentration (2019)[14] of Use Data for Glycerin Ethoxylates.

	# of Uses	Max Conc of Use (%)	# of Uses	Max Conc of Use (%)	# of Uses	Max Conc of Use (%)
	Glycereth-7		**Glycereth-12**		**Glycereth-18**	
Totals*	**80**	**1–2**	**6**	**0.09–0.35**	**21**	**0.019–0.32**
Duration of Use						
Leave-On	*76*	*1*	*6*	*0.21–0.35*	8	*0.019–0.3*
Rinse-Off	*4*	*2*	*NR*	*0.09*	13	*0.3–0.32*
Diluted for (Bath) Use	*0*	*NR*	*NR*	*NR*	NR	*NR*
Exposure Type						
Eye Area	NR	NR	3	0.09–0.35	NR	0.019–0.036
Incidental Ingestion	67	NR	NR	NR	NR	NR
Incidental Inhalation—Spray	6[a]; 2[b]	NR	2[b]	NR	5[a]; 1[b]	NR
Incidental Inhalation—Powder	2[b]	NR	2[b]	NR	1[b]	0.3[c]
Dermal Contact	13	1–2	4	0.09–0.21	21	0.036–0.32
Deodorant (underarm)	NR	NR	NR	NR	NR	NR
Hair—Non-Coloring	NR	NR	NR	NR	NR	NR
Hair—Coloring	NR	NR	NR	NR	NR	NR
Nail	NR	NR	NR	NR	NR	NR
Mucous Membrane	68	NR	NR	NR	9	0.3
Baby Products	NR	NR	NR	NR	NR	NR
	Glycereth-20		**Glycereth-26**			
Totals*	**3**	**NR**	**437**	**0.3–39.5**		
Duration of Use						
Leave-On	*3*	*NR*	338	*0.3–6*		
Rinse Off	*NR*	*NR*	99	*0.9–39.5*		
Diluted for (Bath) Use	*NR*	*NR*	NR	*NR*		
Exposure Type						
Eye Area	NR	NR	18	2–6		
Incidental Ingestion	NR	NR	NR	NR		
Incidental Inhalation—Spray	2[a]; 1[b]	NR	5; 128[a]; 138[b]	1; 0.3–2[a]		
Incidental Inhalation—Powder	1[b]	NR	138[b]	1[c]		
Dermal Contact	2	NR	385	1–39.5		
Deodorant (underarm)	NR	NR	NR	NR		
Hair—Non-Coloring	NR	NR	50	0.3–1		
Hair—Coloring	NR	NR	1	NR		
Nail	NR	NR	NR	NR		
Mucous Membrane	NR	NR	35	NR		
Baby Products	NR	NR	NR	NR		

NR = Not reported.
*Because each ingredient may be used in cosmetics with multiple exposure types, the sum of all exposure types may not equal the sum of total uses.
[a]It is possible these products may be sprays, but it is not specified whether the reported uses are sprays.
[b]Not specified whether a powder or a spray, so this information is captured for both categories of incidental inhalation.
[c]It is possible these products may be powders, but it is not specified whether the reported uses are powders.

ingredients have been reported to be used in products that may come into contact with the eyes; for example, Glycereth-26 is reported to be used at up to 6% in eye lotions. Moreover, these ingredients are reported to be used in spray products that could possibly be inhaled. Glycereth-26 was reported to be used at up to 1% in body and hand spray formulations. In practice, most droplets/particles released from cosmetic sprays have aerodynamic equivalent diameters >10 μm, with propellant sprays yielding a greater fraction of droplets/particles <10 μm compared with pump sprays.[15,16] Therefore, most droplets/particles incidentally inhaled from cosmetic sprays would be deposited in the nasopharyngeal and thoracic regions of the respiratory tract and would not be respirable (i.e., they would not enter the lungs) to any appreciable amount.[16,17]

The ingredients named in the report are not restricted from use in any way under the rules governing cosmetic products in the European Union.[18]

Non-Cosmetic

Ethoxylated glycerol is used in a number of non-cosmetic applications such as modeling clay adhesives, sealants, polymer preparations and compounds, coatings, and paints.[6]

Toxicokinetics Studies

Toxicokinetic data (such as dermal penetration and absorption, distribution, metabolism, and excretion data) were not discovered in the published literature, and unpublished data were not submitted.

Toxicological Studies

Acute Toxicity Studies

The acute dermal, oral, and inhalation studies summarized below are described in Table 5.

The dermal LD_{50} of ethoxylated glycerol in male and female Wistar rats was >5000 mg/kg.[6] The oral LD_{50} of ethoxylated glycerol tested at concentrations of 1%–50% was >10 ml/kg in male and female Fischer 344 rats. In female Wistar rats, the oral LD_{50} of ethoxylated glycerol was >2000 mg/kg. In another oral toxicity study, the LD_{50} of ethoxylated glycerol in Sprague-Dawley rats was >10000 mg/kg.[6] In an acute oral toxicity study of Glycereth-26, the LD_{50} was determined to be >5000 mg/kg in male and female albino rats.[19]

In an acute inhalation toxicity study, performed in accordance with Organization for Economic Co-operation and Development test guideline (OECD TG) 403, no mortality was observed when male and female rats were exposed (whole body) to an aerosol of 3.575 mg/l of ethoxylated glycerol for 8 h.[6] In an inhalation study of ethoxylated glycerol performed in accordance with OECD TG 403, in which rats were exposed to 0.178 mg/l of the test article for 7 h, no mortalities were observed.[6] Similarly, no mortalities were observed in rats following exposure (whole body) to 0.143 mg/l of the ethoxylated glycerol for 7 h as a vapor.

Developmental and Reproductive Toxicity Studies

Developmental and reproductive toxicity studies were not discovered in the published literature, and unpublished data were not submitted.

Genotoxicity Studies

Genotoxicity data were not found for the glycerin ethoxylates reviewed in this report. However, data for ethoxylated glycerol and propoxylated glycerol were reported,[6] which enabled evaluation of genotoxicity. These read-across sources are mixtures of compounds similar or identical to glycerin ethoxylates. These molecules are predicted to have similar absorption, distribution, metabolism and chemical reactivity to glycerin ethoxylates and these compounds are expected to have similar toxicological profiles.

In Vitro

Glycereth-3 (Ethoxylated Glycerol, A Read-Across Source). The mutagenicity of ethoxylated glycerol was evaluated in an Ames test, performed in accordance with OECD TG 471.[6] *Salmonella typhimurium* strains TA1535, TA1537, TA98, and TA100 and *Escherichia coli* WP2 were studied with and without metabolic activation. The test article, dissolved in water, was administered at concentrations of 0, 33, 100, 333, 1000, 2500, and 5000 μg/plate. Appropriate positive and negative controls were used. The test article did not produce any mutagenic effects.

Propoxylated Glycerol (A Read-Across Source). In a mammalian chromosomal aberration study performed in accordance with OECD TG 473, a propoxylated glycerol was considered to be non-clastogenic to human lymphocytes with or without metabolic activation.[6] (No other details were provided.)

Carcinogenicity Studies

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

Dermal Irritation and Sensitization Studies

The dermal irritation and sensitization studies summarized below are described in Table 6.

In an in vitro study, performed in accordance with OECD TG 439, it was determined that no irritation occurred when 30 μl of ethoxylated glycerol was applied undiluted to a reconstructed three-dimensional human epidermis model (EpiDerm™).[6]

Table 5. Acute Toxicity Studies.

Test Article Concentration/ Vehicle	Animals	No./Group	Dose/Protocol	LD_{50}/Results	Reference
			Dermal		
Ethoxylated glycerol; undiluted	Wistar rats	5/sex	According to OECD TG 402. Rats were dermally administered 5000 mg/kg test article; applied to a 40 cm^2 skin area and covered by a semi-occlusive dressing for 24 h.	No mortality occurred. No systemic clinical signs were observed during clinical examination. No local effects were observed. LD_{50} is >5000 mg/kg	[6]
			Oral		
Ethoxylated glycerol; in water	Fischer 344 rats	13 male and 11 females	Similar to OECD TG 401. Three females were administered 0.025 ml/kg of a 1% (v/v) solution another 3 female rats were administered 0.2 ml/kg of a 10% solution. Three male rats were administered 1.6 ml/kg of a 10% solution. Another 5 male rats were administered 3.2 ml/kg of a 50% solution. Five females were administered 6.4 ml/kg of a 50% solution and 5 males were administered 10 ml/kg of a 50% solution. Ten untreated animals were used as a negative control.	No mortality occurred and no abnormalities observed. The LD_{50} in male and female rats is >10 ml/kg.	[6]
Ethoxylated glycerol; undiluted	Wistar rats	2 groups of 3 females	According to OECD TG 423. Both groups of rats were administered a maximum dosage-volume of 1.73 ml/kg, and received a 2000 mg/kg dose of the test article, via gavage.	No mortality occurred. No clinical signs were observed during the observation period. The mean body weight of the test groups increased throughout the study period within the normal range. LD_{50} is >2000 mg/kg	[6]
Ethoxylated glycerol; undiluted	Sprague-Dawley rats	5/sex	Similar to OECD TG 401. Five male rats were administered 11,550 mg/kg bw and 5 female rats were administered 10,000 mg/kg bw dose, via gavage. Animals were observed for 14 d after administration.	No mortality occurred. Diarrhea was noted for a few hours after application; aggressiveness, convulsion and dirty fur were observed at days 3 and 4; animals fully recovered within 5 d. LD_{50} in male and female rat is >10000 mg/kg	[6]
Glycereth-26	Albino rats	5/sex	Animals were dosed orally (route of administration not specified) with 5000 mg/kg bw and were observed for 14 d for toxicity endpoints.	No mortality occurred during the observation period and the LD_{50} was determined to be >5000 mg/kg	[19]
			Inhalation		
Ethoxylated glycerol	White, normal rats	3/sex	Similar to OECD TG 403. Rats were exposed to 3.575 mg/l of the test article in an aerosol/mist form for 8 h and observed for 14 d.	No mortality or clinical signs of toxicity noted	[6]
Ethoxylated glycerol; no vehicle	Rats	6 animals (males and females)/ experiment	Similar to OECD TG 403. Rats were exposed (whole body) to 0.178 mg/l in experiment 1 and 0.143 mg/l in experiment 2 as a vapor for 7 h and observed for 14 d.	No mortality or clinical signs of toxicity noted.	[6]

In a study using methods comparable to OECD TG 404, no edema or erythema occurred when 1 ml of ethoxylated glycerol was applied to the shaved skin of 2 Vienna white rabbits, under occlusion.[6] The test article was considered to be non-irritating to rabbit skin. Three male and 3 female rabbits had single applications of 0.5 ml of Glycereth-26 applied under an occlusive patch on both abraded and non-abraded sites; the test article was deemed to have no irritation potential.[19] In a Buehler test, performed in 10 male and 10 female Dunkin Hartley guinea pigs, in accordance with OECD TG 406, propoxylated glycerol was shown to be a non-sensitizer.[6]

An undiluted leave-on spray formulation containing 1.68% Glycereth-7 was tested in an occlusive human repeat insult patch test (HRIPT) in 199 subjects.[20–22] No participants withdrew due to adverse reactions; 4 subjects exhibited low-level reactions; the test material did not induce dermal sensitization. A rinse-off, cleanser formulation containing 2% Glycereth-7 was tested in a similar occlusive HRIPT in 211 subjects.[21,22] Two subjects exhibited low-level reactions during induction, and 11 subjects exhibited low-level reactions during challenge. An occlusive HRIPT of a mascara formulation containing 0.35% Glycereth-12 was completed in 100 subjects; there were no signs of irritation or sensitization.[23] In an HRIPT of a 3% Glycereth-26 rinse-off product in 103 subjects, 5 subjects exhibited low-level reactions during induction, and 1 subject exhibited a low-level reaction during challenge. The test material was deemed a non-sensitizer. The contact sensitization potential of a topically applied formulation containing 3% Glycereth-26 was evaluated in a maximization study of 27 subjects.[25] No instances of contact allergy or irritation were observed during the challenge scorings, and the test substance was deemed a non-sensitizer. A leave-on product containing 3% Glycereth-26 was tested in an HRIPT in 200 subjects; 27 subjects exhibited low-level reactions during induction.[20,22] The researchers concluded that the test material did not induce significant dermal irritation or allergic contact sensitization. Low level reactions were observed during the induction phase of an HRIPT, completed in 200 subjects, evaluating a leave-on product containing 3% Glycereth-26.[22,24] Twenty-four subjects exhibited low-level reactions, and 1 subject exhibited a high-level reaction during induction; the researchers concluded that the test material did not induce dermal sensitization. A product containing 5% Glycereth-26 was tested in an HRIPT on 55 subjects; the test material did not demonstrate a potential for eliciting dermal irritation or allergic contact sensitization.[26] A modified semi-occlusive HRIPT of a shaving oil formulation containing 8.75% Glycereth-26 was completed in 221 subjects.[27] Faint erythema was noted following removal of the initial 24-h application on 11 subjects and in 1 subject following the challenge application, however, these effects dissipated within 24 h. The test material was not found to be a skin irritant or sensitizer. An HRIPT of a 10% aqueous solution of Glycereth-26 was performed in 200 subjects.[28] No visible skin changes were observed, and test substance was deemed a non-sensitizer.

Ocular Irritation Studies

The ocular irritation studies summarized below are described in Table 7.

The potential irritation of ethoxylated glycerol was studied in a bovine corneal opacity and permeability (BCOP) test conducted according to OECD TG 437.[6] It was concluded the test substance does not cause serious eye damage. In another eye irritation test evaluating ethoxylated glycerol, in accordance with OECD TG 405 and using an EpiOcular™ three-dimensional human cornea model, the test article was considered to be non-irritating.[6] In an EpiOcular™ assay, a 20% aqueous dilution of a product containing 0.35% Glycereth-12 (actual test concentration, 0.07% Glycereth-12) was tested using 100 µl; the estimated Draize ocular irritation score of the test material at 100% was predicted to be 0, and it was classified to be non-irritant.[29] The ocular irritation potential of undiluted Glycereth-26 (100 µl) was evaluated in vitro in an EpiOcular™ human cell assay.[30] The ET_{50} (time to reduce tissue viability as measured using a 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay) was >4 h for Glycereth-26.

The ocular irritation potential of ethoxylated glycerol was evaluated in 2 Vienna white rabbits using a test method that is similar to OECD TG 405.[6] Slight conjunctivae redness was observed in both animals after 10 min, 1 h, and 3 h; these effects were fully reversible within 24 h and the test article was found to be non-irritating. In another study, two 2 Vienna white rabbits were used to test the ocular irritation potential of ethoxylated glycerol following a protocol similar to OECD TG 405.[6] Hyperemia was noted in the blood vessels of both animals. In one animal, this effect was not fully reversible within 8 d; however, a similar observation was noted in the control eye of this animal. The test article was considered non-irritating. Six rabbits were administered a single 1.8–2.4 g, 0.1 ml, dose of Glycereth-26, without washing, for 24 h.[19] Ocular irritation to eye mucosa, cornea, iris, and bulbar/palpebral conjunctivae was observed; however, the irritation score was 0.0, and the test article was deemed non-irritating under these test conditions.

Summary

This is a safety assessment of 8 glycerin ethoxylates as used in cosmetics. These ingredients are all polyethylene glycol ethers of glycerin. All of the ingredients in this report are reported to function as skin-conditioning agents, and most are reported to function as viscosity-decreasing agents. Ethoxylated glycerols and propoxylated glycerol were considered structurally, and hence toxicologically, similar to glycerin ethoxylates; data for these substances are included in this safety assessment as read-across sources for these ingredients.

These ingredients are mostly used in leave-on formulations. Glycereth-26 has the highest reported frequency of use (437 formulations), and Glycereth-7 has the second greatest

Table 6. Dermal Irritation and Sensitization Studies.

Test Article	Concentration/Dose	Test Population	Procedure	Results	Reference
			In Chemico/In Vitro Studies		
Ethoxylated glycerol	30 μl, undiluted	EpiDerm™	OECD TG 439. Single application of 30 μl of the test article to the epidermis model. Sterile PBS (30 μl) was used as the negative control. The tissues were washed with sterile PBS 1 h after the application.	Not irritating	[6]
			Animal		
Ethoxylated glycerol	1 ml	2 Vienna white rabbits	Comparable to OECD TG 404. Glycereth-3 (1 ml) was applied neat to shaved skin area of 2.5 cm × 2.5 cm by an occlusive dressing for 20 h, and the test sites were observed at 24 h, 48 h, and 8 d. No edema and erythema findings were observed.	Not irritating	[6]
Glycereth-26	0.5 ml	3 male and 3 female rabbits (strain not specified)	A single application of 0.5 ml of Glycereth-26 applied under an occlusive patch on both abraded and non-abraded sites. The tested areas were observed at 24 and 72 h after application. The irritation score was 0.0, and the test article was deemed to have no irritation potential.	Not irritating	[19]
Propoxylated glycerol	0.5 ml	10 male and 10 female Dunkin Hartley guinea pigs	OECD TG 406; Buehler test. Animals were patched with 0.5 ml of the undiluted test article (MW 300 g/mol) for the topical induction, using an occlusive dressing, for 6 h on d 1, 7, and 14. Challenge consisted of a topical application of 0.5 ml undiluted test article held in place by an occlusive dressing for a 6-h exposure period on day 28. Five males and 5 females served as the control group. The test article was not a sensitizer.	Not sensitizing	[6]
			HUMAN		
Leave-on spray; 1.68% Glycereth-7	0.2 g	199	In an HRIPT, the test material was applied, under occlusion, for 24 to 48 h via nine, 0.2 g induction applications, made over a 3-wk induction period. After a 2-wk rest period, a 24-h challenge application was made to a previously untreated site in the same manner as the induction applications, and reactions were scored at 24, 48, 72, and 96 h after application. No participants withdrew due to adverse reactions; 4 subjects exhibited low-level reactions (a 0–1 score, on a 0–4 scoring scale) during induction. The test material did not induce dermal sensitization.	Not sensitizing	[20–22]

(continued)

Table 6. (continued)

Test Article	Concentration/Dose	Test Population	Procedure	Results	Reference
Rinse-off cleanser; 2% Glycereth-7	1% v/v (in tap water, effective concentration, 0.02%)	211	An HRIPT was conducted. The test material was diluted to 1% v/v with tap water (effective test concentration, 0.02%). Two subjects exhibited low-level (+/-) reactions during induction, and 11 subjects exhibited low-level (+/-) reactions during challenge. The researchers concluded that although there was no primary dermal irritation potential, cumulative dermal irritation and sensitization potential were observed. ((Individual test scores were not provided.)	Not irritating or sensitizing	21,22
Mascara; 0.35% Glycereth-12	0.2 g	100	The test material was applied with an occlusive, hypoallergenic patch to the infrascapular regions of the back for 9 applications. After a 14-day rest period, the same concentration and amount of the test substance was used in the challenge phase; patches were applied to a previously untested site, and reactions were scored 24 and 48 h after application. There were no signs of irritation or sensitization in those who completed the study.	Not sensitizing	23
Rinse-off product; 3% Glycereth-26	0.02 ml	103	The test material was applied, undiluted, under semi-occlusion, for 24 to 48 h via, nine 0.02 ml induction applications, made over a 3-wk induction period. After a 2-wk rest period, a 24-h challenge application was made to a previously untreated site in the same manner. One participant withdrew due to an adverse reaction; 5 subjects exhibited low-level reactions during induction, and 1 subject exhibited a low-level reaction ("?") at 72 h during challenge. The researchers concluded that although there was no primary dermal irritation, cumulative dermal irritation and sensitization potential was observed.	Not sensitizing	22,24

(continued)

Table 6. (continued)

Test Article	Concentration/Dose	Test Population	Procedure	Results	Reference
Topical formulation; 3% Glycereth-26	0.05 ml	27	A maximization study was performed in which a total of 5 induction applications were made, under occlusion, to the upper outer arm, forearm, or back of subjects. Prior to each induction application, a 24-h application of 0.05 ml of 0.25% aqueous sodium lauryl sulfate (SLS) was made, under occlusion. After removal of the SLS-pre-treatment patch, 0.5 ml of the test material was applied for 48–72 h in an induction patch. If no irritation was present after removal of the induction patch, the 0.25% aqueous SLS patch was reapplied to the same site for 24 h, followed by reapplication of a fresh induction patch with the test material to the same site. However, if irritation occurred during the induction phase, the SLS patch was not re-applied, and a second 0.5 ml patch of the test material was applied to the same site after a 24-h rest period. After a 10-d rest period, subjects were pre-treated with 0.05 ml of 5% aqueous SLS for 1 h on a novel site, prior to a 48-h challenge application, in the same manner as the induction applications. Challenge reactions were scored 15–30 min and 24 h after patch removal; no instances of contact allergy or irritation were observed and the test substance was deemed a non-sensitizer.	Not sensitizing	[25]
Leave-on product; 3% Glycereth-26	20 μl	200	The test material was applied, under occlusion, for 48 to 72 h via nine, 20 μl induction applications, made over a 3-wk induction period. After a 2-wk rest period, a 24-h challenge application was made to a previously untreated site in the same manner as the induction applications, and reactions were scored at 48 and 96 h after application. No participants withdrew due to adverse reactions; 27 subjects exhibited low-level reactions (0–1 score, on a 0–7 scale) during induction, and no reactions occurred during challenge. The researchers concluded that the test material did not induce significant dermal irritation or allergic contact sensitization.	Not sensitizing	[20,22]

(continued)

Table 6. (continued)

Test Article	Concentration/Dose	Test Population	Procedure	Results	Reference
Leave-on product; 3% Glycereth-26	20 µl	200	The test material was applied, neat, under occlusion, for 24 to 48 h via, nine 20 µl induction applications, made over a 3-wk induction period. After a 2-wk rest period, a 24-h challenge application was made to a previously untreated site in the same manner. No participants withdrew due to adverse reactions; 24 subjects exhibited low-level reactions and 1 subject exhibited a high-level reaction during induction, no subjects exhibited any reactions during challenge. The researchers concluded that the test material did not induce dermal sensitization.	Not sensitizing	22,24
5% Glycereth-26	NS	55	An HRIPT was performed in which the test material was applied to a 1 in^2 absorbent pad portion of an adhesive dressing and applied to the skin under semi-occlusion for 24 h. Nine induction applications were made. After a 2-wk non-treatment period, a 24-h challenge application was made to a previously untreated site in the same manner as the induction applications, and reactions were scored 24 and 72 h after application. The test material did not demonstrate a potential for eliciting dermal irritation or allergic contact sensitization.	Not sensitizing	26
Shaving oil formulation; 8.75% Glycereth-26	0.15 ml	221	A modified HRIPT was performed in which the test material was applied to a 2 cm^2 absorbent pad portion of a semi-occlusive patch for 24 h. Nine induction applications were made. After a 2-wk non-treatment period, a 24-h challenge application was made to a previously untreated site in the same manner as the induction applications. Reactions to induction applications were scored both prior to, and after patch application, and at 24, 48, and 72 h after challenge application. Faint erythema was noted following removal of the initial 24-h application on 11 subjects and in 1 subject following the challenge application, however, these effects dissipated within 24 h. The test material was not found to be a skin irritant or sensitizer.	Not sensitizing	27

(continued)

Table 6. (continued)

Test Article	Concentration/Dose	Test Population	Procedure	Results	Reference
10% Glycereth-26, aqueous	NS	200	Discs of lintine paper were moistened with the test material (amount not specified) and secured to a site on the upper arm for 24 h. After 24 h, the patch was removed and the contact site was rested for 24 h. Repeated 24-h patch applications were applied 3 times/wk, for 5 wk, for a total of 15 applications. After a 2-wk non-treatment period, the challenge patch was applied on the same contact sites with the test material (amount not specified) for 24 h under occlusion. Upon removal of the challenge patch, the contact site was examined immediately and after 24 and 48 h. No visible skin changes occurred upon challenge, and test substance was deemed a non-sensitizer.	Not sensitizing	[28]

HRIPT: human repeated insult patch test; MW: molecular weight; NS: not specified; PBS: phosphate buffered saline.

reported number of uses (80). Glycereth-26 has the highest concentration of use, at 39.5% in skin cleansing products. The highest concentrations of use reported for products resulting in leave-on dermal exposure is 6% Glycereth-26 in eye lotions.

The acute dermal LD_{50} of ethoxylated glycerol was calculated to be >5000 mg/kg in Wistar rats. No acute toxicity was observed when ethoxylated glycerol was administered orally at concentrations ranging from 1%–50% to male and female Fischer 344 rats. The oral LD_{50} was determined to be >10 ml/kg. No evidence of toxicity was observed in an acute oral toxicity study using female Wistar rats; the oral LD_{50} of ethoxylated glycerol was determined to be >2000 mg/kg. Similarly, no evidence of toxicity was reported when ethoxylated glycerol was administered orally to Sprague-Dawley rats, and the LD_{50} was >10000 mg/kg. In an acute oral toxicity study of Glycereth-26, the LD_{50} was determined to be >5000 mg/kg dose.

Two studies were performed in accordance with OECD guidelines, in which rats were used to determine acute inhalation toxicity. Ethoxylated glycerol at a concentration of 3.575 mg/l, was tested in rats as an aerosol/mist for 8 h. No mortality occurred. The acute inhalation toxicity of ethoxylated glycerol was evaluated in studies involving rats; animals were exposed whole-body to 0.178 mg/l and 0.143 mg/l, for 7 h each. No mortality occurred.

Ethoxylated glycerol was not mutagenic in Ames tests at concentrations up to 5000 µg/plate, with or without metabolic activation, in S. *typhimurium* strains TA1535, TA1537, TA98, and TA100, or *E. coli* WP2. In a mammalian chromosomal aberration study, a propoxylated glycerol was not clastogenic to human lymphocytes (concentrations not reported), with or without metabolic activation.

According to the results of an EpiDerm™ assay, ethoxylated glycerol is not expected to be irritating. In a dermal irritation study, ethoxylated glycerol was applied for 20 h to a shaved skin area of 2.5 cm × 2.5 cm on 2 Vienna white rabbits using an occlusive dressing. The test article was considered to be non-irritating to the skin. In another study, 3 male and 3 female rabbits had 0.5 ml of Glycereth-26 applied once under an occluded patch on both abraded and non-abraded sites, with no signs of irritation observed at 24 and 72 h after application. The test article was deemed to have no irritation potential. The sensitization potential of a propoxylated glycerol (MW = 300 g/mol) was evaluated in a Buehler test using 10 male and 10 female Dunkin Hartley guinea pigs. Six-hour occlusive patches of undiluted test article were used for both induction (days 1, 7, and 14) and challenge. The test article was not a sensitizer.

An undiluted spray formulation containing 1.68% Glycereth-7 was tested undiluted for skin sensitization potential in an HRIPT completed in 199 subjects. Four subjects exhibited low-level reactions during induction; the test material did not induce dermal sensitization. A rinse-off product containing 2% Glycereth-7 was tested for skin sensitization potential via occlusive HRIPT, in up to 211 subjects. Two subjects exhibited low-level reactions during induction, and 11 subjects during challenge, for the rinse-off product, and the test material was deemed non-sensitizing. A mascara formulation containing 0.35% Glycereth-12 was evaluated for skin sensitization potential in an HRIPT using 100 subjects. Neither irritation nor sensitization were observed. A rinse-off product containing 3% Glycereth-26 was tested undiluted in a semi-occlusive HRIPT in 103 subjects; 5 subjects exhibited low-level reactions during induction, and 1 subject exhibited a

Table 7. Ocular Irritation Studies.

Test Article	Concentration/Dose	Test Population	Procedure	Results	Reference
			In Vitro		
Ethoxylated glycerol	750 µl	BCOP test	OECD TG 437. Ethoxylated glycerol was applied directly to the epithelial surface of the cornea using a syringe (open chamber method) for 10 minutes. Highly deionized water was used as the negative control, and a 1% (w/v) solution of sodium hydroxide in highly de-ionized water served as the positive control (treatment group consisted of 3 corneas). The opacity and permeability assessments of the cornea were derived by an IVIS, which is used to classify the irritancy level of the test article. The calculated mean IVIS was 3.0 ± 1.2, 2.6 ± 3.3, and 184.0 ± 20.9 in the test group, the negative control group, and the positive control group, respectively. It was concluded the test substance does not cause serious eye damage in the BCOP test.	Not irritating	[6]
Ethoxylated glycerol	50 µl	EpiOcular™	OECD TG 405. Fifty microliters of the undiluted test article were applied (2 tissue sample per treatment). The treated tissue was incubated for 30 min, washed out, and post-incubated under normal medium and culture conditions for 2 h. The negative control tissues received applications of 50 µl of highly de-ionized water. The test article was considered to be non-irritating.	Not irritating	[6]
0.35 % Glycereth-12 (20% aqueous dilution)	100 µl; effective concentration 0.07% Glycereth-12	EpiOcular™	Appropriate negative and positive controls were used. The estimated Draize ocular irritation score of the test material at 100% was predicted to be 0, and it was classified to be non-irritant.	Not irritating	[29]
Glycereth-26	100 µl	EpiOcular™, human cell assay	The cell cultures were tested in duplicate, with exposure times of 0.33, 1, 2, and 4 h. Appropriate negative and positive controls were used. The ET_{50} (time to reduce tissue viability as measured using MTT) was >4 h for Glycereth-26; this was predicted to be non-irritating.	Not irritating	[30]
			ANIMAL		
Ethoxylated glycerol	50 µl; undiluted	2 Vienna white rabbits	Similar to OECD TG 405. Undiluted ethoxylated glycerol was instilled into the conjunctival sac of the right eye of each animal without washing, and the eyes were observed for 8 d. The left eye of the animals remained untreated and served as a control. Slight conjunctivae redness was observed in both animals after 10 min, 1 h, and 3 h. These effects were fully reversible within 24 h. The test article was found to be non-irritating.	Non-irritating	[6]

(continued)

Table 7. (continued)

Test Article	Concentration/Dose	Test Population	Procedure	Results	Reference
Ethoxylated glycerol	50 µl	2 Vienna white rabbits	Similar to OECD TG 405. Undiluted ethoxylated glycerol was instilled into the conjunctival sac of one eye of each animal. The saline-treated contralateral eye served as a control. The eyes were not washed out and were observed for a total of 8 d. Hyperemia was noted in the blood vessels of both animals. In one animal, this effect was not fully reversible within 8 d; however, a similar observation was noted in the control eye of this animal. The test article was considered non-irritating.	Non-irritating	[6]
Glycereth-26	1.8–2.4 g, 0.1 ml	6 rabbits (strain not specified)	The animals received a single instillation of the test article dose, without washing for 24 h. Ocular irritation to eye mucosa, cornea, iris, and bulbar/palpebral conjunctivae was observed for 7 d. However, the irritation score was 0.0, and the test article was deemed non-irritating under these test conditions.	Non-irritating	[19]

BCOP: bovine corneal opacity and permeability.
IVIS: In Vitro Irritancy Score.

low-level reaction during challenge; the test substance was deemed non-sensitizing. The contact sensitization potential of a topical formulation containing 3% Glycereth-26 was evaluated in a maximization study using 27 subjects. No instances of post-challenge contact allergy or irritation were observed, and the test substance was deemed a non-sensitizer. A leave-on product containing 3% Glycereth-26 was evaluated in an HRIPT in 200 subjects. Twenty-seven subjects exhibited low-level reactions during induction; the researchers concluded that the test material did not induce significant dermal irritation and allergic contact sensitization. A leave-on product containing 3% Glycereth-26 was tested undiluted in an occlusive HRIPT in 200 subjects; 24 subjects exhibited low-level reactions, and 1 subject exhibited a high-level reaction, during induction; the test material did not induce dermal sensitization. The skin sensitization potential of a product containing 5% Glycereth-26 was evaluated in an HRIPT involving 55 subjects. No adverse reactions were observed, and there were no instances of dermal irritation or allergic contact sensitization. An HRIPT of a shaving oil formulation containing 8.75% Glycereth-26 was completed in 221 subjects; faint erythema that was observed in 11 subjects during induction and 1 subject following challenge resolved within 24 h, and the test material was not found to be a skin irritant or sensitizer. An HRIPT was performed in 200 subjects on a 10% aqueous solution of Glycereth-26; neither changes in skin nor signs of sensitization were observed during the induction or challenge applications.

The potential of ethoxylated glycerol to cause damage to the eyes was evaluated in vitro in a BCOP test and in an EpiOcular™ assay. The test article did not show ocular irritation potential under either the test condition. In an EpiOcular™ assay, a 20% aqueous dilution of a product containing 0.35% Glycereth-12 was predicted to not be an ocular irritant, and in the same type of assay, undiluted Glycereth-26 was predicted to be non-irritating.

The ocular irritation potential of ethoxylated glycerol was studied using 2 Vienna white rabbits. The test article was found to be non-irritating. In another study, in which 50 µl of undiluted ethoxylated glycerol was applied to the conjunctival sac of one eye of 2 white Vienna rabbits, hyperemia was noted in blood vessels of both animals. In one animal, this effect was not fully reversible within 8 d; however, a similar observation was made in the control eye. The test article was determined to be non-irritating. In rabbits administered single instillations of 1.8–2.4 g, 0.1 ml, Glycereth-26 for 24 h without washing, the ocular irritation score was 0.0, and the test article was deemed non-irritating under these test conditions.

Discussion

The 8 glycerin ethoxylates reviewed in this document are structurally-related as PEG ethers of glycerin. Data for a few toxicological endpoints were not available for these ingredients; however, data on several endpoints for read-across sources, including acute toxicity, genotoxicity, in vitro dermal irritation, animal sensitization, and animal ocular irritation, have been included this report. The Panel considered ethoxylated glycerol and propoxylated glycerol to have similar chemical and toxicological profiles to the ingredients being reviewed, and felt that these read-across sources could

be utilized, as appropriate, to mitigate data gaps. Furthermore, the Panel deemed these read-across sources as representative of lower molecular weight glycerin ethoxylates, and were reassured by their similarity to previously reviewed polyethoxylated ingredients.

The Panel discussed the issue of incidental inhalation exposure from formulations which are aerosolized, such as the body and hand spray formulations containing 1% Glycereth-26. The Panel noted that in aerosol products, most droplets/particles would not be respirable to any appreciable amount. Furthermore, droplets/particles deposited in the nasopharyngeal or bronchial regions of the respiratory tract present no toxicological concerns. In results from an acute inhalation study of rats with an aerosol of 3.575 mg/l Glycereth-3, the smallest and most volatile of these ingredients, no mortality and no clinical or gross pathology were observed. Coupled with the small actual exposure in the breathing zone and the concentrations at which the ingredients are used, the available information indicates that incidental inhalation would not be a significant route of exposure that might lead to local respiratory or systemic effects. A detailed discussion and summary of the Panel's approach to evaluating incidental inhalation exposures to ingredients in cosmetic products is available at https://www.cir-safety.org/cir-findings.

Finally, in a guinea pig maximization test, an undiluted application of ethoxylated glycerol was non-sensitizing. This result was in agreement with the Panel's assessment that this family of polyethylene glycol ethers of glycerin does not have the propensity to react with proteins, and does not possess a mechanistic basis to cause sensitization, or to produce metabolites of concern. However, HRIPT data verified the presence of low-level reactions during the induction, and sometimes challenge, phase for a few ingredients. The Panel, consequently, concluded that these ingredients are safe as used when formulated to be non-irritating.

Conclusion

The Expert Panel for Cosmetic Ingredient Safety concluded that the following 8 ethoxylated glycerin ingredients are safe in cosmetics in the present practices of use and concentration described in this safety assessment when formulated to be non-irritating.

Glycereth-3*	Glycereth-8*	Glycereth-18	Glycereth-26
Glycereth-7	Glycereth-12	Glycereth-20	Glycereth-31*

* *Not reported to be in current use. Were ingredients in this group not in current use to be used in the future, the expectation is that they would be used in product categories and at concentrations comparable to others in this group.*

Author's Note

Unpublished sources cited in this report are available from the Director, Cosmetic Ingredient Review, 555 13th St., NW, Suite 300W, Washington, DC 20004. cirinfo@cir-safety.org

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