Safety Assessment of *Centaurea cyanus* Flower-Derived Ingredients as Used in Cosmetics

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*All interested persons are provided 60 days from the above release date [i.e., **May 23, 2026**] to comment on this safety assessment, and to identify additional published data that should be included or provide unpublished data which can be made public and included. Information may be submitted without identifying the source or the trade name of the cosmetic product containing the ingredient. All unpublished data submitted to CIR will be discussed in open meetings, will be available for review by any interested party, and may be cited in a peer-reviewed scientific journal. Please submit data, comments, or requests to the CIR Executive Director, Dr. Bart Heldreth.*

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ABBREVIATIONS

A459	human lung adenocarcinoma epithelial cell
Caco-2	human colorectal adenocarcinoma epithelial cell
CGE	cyanidin-3-glucoside equivalent
CIR	Cosmetic Ingredient Review
Council	Personal Care Products Council
COX-2	cyclooxygenase-2
Dictionary	*International Cosmetic Ingredient Dictionary*
dw	dry weight
ELISA	enzyme-linked immunosorbent assay
FDA	Food and Drug Administration
GAE	gallic acid equivalent
GC-MS	gas chromatography-mass spectrometry
GI_{50}	half-maximal growth inhibition concentration
HeLa	human cervical carcinoma cell
HepG2	human hepatocellular carcinoma cell
IC_{50}	half-maximal inhibitory concentration
IL	interleukin
iNOS	nitric oxide synthase
INT	*p*-iodonitrotetrazolium chloride
l.o.	leave-on
LPS	lipopolysaccharide
MCF-7	human breast adenocarcinoma cell
MIC	minimum inhibitory concentration
MoCRA	Modernization of Cosmetics Regulation Act of 2022
MTT	3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide
NCI-H460	non-small cell lung cancer cell
NR	not reported
Panel	Expert Panel for Cosmetic Ingredient Safety
PLP2	porcine liver primary cell
QE	quercetin equivalent
RAW 264.7	mouse macrophage cell
RLD	Registration and Listing Data
r.o.	rinse-off
RT-qPCR	reverse transcription quantitative polymerase chain reaction
SRB	sulforhodamine B
TNF-α	tumor necrosis factor-α
US	United States

INTRODUCTION

This assessment reviews the safety of the following 3 *Centaurea cyanus* flower-derived ingredients as used in cosmetic formulations:

Centaurea Cyanus Flower
Centaurea Cyanus Flower Extract
Centaurea Cyanus Flower Water

According to the web-based *International Cosmetic Ingredient Dictionary* (*Dictionary*), two of these ingredients are reported to function in cosmetics as skin-conditioning; additional functions are also reported (Table 1).[1] The *Dictionary* does not report a function for Centaurea Cyanus Flower.

Some of the ingredients reviewed in this safety assessment may be consumed as food, and daily exposure from food use would result in much larger systemic exposures than those from use in cosmetic products. The primary focus of the safety assessment of these ingredients as used in cosmetics is on the potential for effects from topical exposure.

Botanicals, such as *Centaurea cyanus* flower-derived ingredients, may contain hundreds of constituents. In this assessment, the Expert Panel for Cosmetic Ingredient Safety (Panel) is evaluating the potential toxicity of each of the *Centaurea cyanus* flower-derived ingredients as a whole, complex substance; toxicity from single components may not predict the potential toxicity of botanical 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 extensive search of the world's literature; a search was last conducted in March 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.

It should be noted that though the primary focus of this report is *Centaurea cyanus* flower-derived ingredients, a few studies testing the whole *Centaurea cyanus* plant were included. The whole plant presumably contains the flower, and therefore the data may be meaningful for the Panel's consideration.

The cosmetic ingredient names, according to the *Dictionary*, are written as listed above, without italics and without abbreviations. When referring to the plant from which these ingredients are derived, the standard scientific practice of using italics will be followed (i.e., *Centaurea cyanus*). Often in the published literature, the general name cornflower is used. If it is not known whether the substance being discussed is equivalent to the cosmetic ingredient, the test substance will be identified by the name used in the publication that is being cited (*Centaurea cyanus* flower). However, if it is known that the substance is a cosmetic ingredient, the *Dictionary* nomenclature (e.g., Centaurea Cyanus Flower) will be used.

CHEMISTRY

Definition and Plant Identification

The definitions of the ingredients included in this review are provided in Table 1. All the ingredients are obtained from the flowers of the *Centaurea cyanus* plant. The CAS no. given in the *Dictionary* for Centaurea Cyanus Flower Extract is 164288-50-0.[1]

Centaurea cyanus is a flowering weed that belongs to the family Asteraceae.[2] It is native to Europe and Asia but is now cultivated worldwide, including in the United States (US). The plant has a slender, densely pubescent stem that is bright green in color and up to 3 mm wide. The lanceolate leaves are also pubescent and feature a strong central vein.[2,3] *Centaurea cyanus* inflorescences are monopodial and blue in color; flowerheads are 1.5 - 3 cm wide with sterile, funnel-shaped ray florets surrounding a central cluster of disc florets with tubular, fused petals. Numerous bracts, bordered by brown-toothed fringes, enclose the flower head. The plant is considered to have a pleasant, aromatic odor.

Chemical Properties

Chemical properties of *Centaurea cyanus* flower-derived ingredients were not found in the published literature, and unpublished data were not submitted.

Method of Manufacture

Methods used to manufacture *Centaurea cyanus* flower-derived ingredients were primarily not found in the published literature, and unpublished data were not submitted. However, the definition of Centaurea Cyanus Flower Water, as given in the *Dictionary*, provides insight as to the method of manufacture; i.e., an aqueous solution of the steam distillate obtained from the flowers of *Centaurea cyanus*.[1]

Composition and Impurities

Centaurea cyanus comprises compounds such as flavonoids, polyphenols, aromatic acids, amino acids, sugars, and coumarins.[2] The seeds contain alkaloids. *Centaurea cyanus* has also been found to contain heavy metals such as lead, zinc, copper, and chromium.[4]

Centaurea Cyanus Flower

A gas chromatography-mass spectrometry (GC-MS) analysis of fresh *Centaurea cyanus* flowers found a total of 24 sesquiterpenoids (including 15 bicyclic sesquiterpenes; 89.52%), 1 oxygenated monoterpene (5.22%), and 5 unknown volatile compounds (5.26%).[5] The total anthocyanin (the component that gives the flowers their blue color) content of a *Centaurea cyanus* flower sample was determined to be 1012.09 mg/kg fresh weight.[6] Anthocyanin concentration differs based on flower color, with the highest concentration found in purple flowers (1.36 - 3.63%).[2]

Centaurea Cyanus Flower Extract

The major components of a 70% ethanol extract of *Centaurea cyanus* flower (determined by GC-MS) were catechol and α-amyrin; total phytochemical composition values are provided in Table 2.[7] Total phenolic content was determined to be 97.9 mg gallic acid equivalent (GAE)/l, and total flavonoid content was determined to be 118.52 mg quercetin equivalent (QE)/l. Quantified values of rutin, quercetin, and hesperidin were 13.2, 5.6, and 13.2 mg/l respectively. The total polyphenol content of a 70% hydromethanolic extract of *Centaurea cyanus* flower was determined by spectrocolorimetric method to be 12.49 mg GAE/g dried extract.[8]

The composition of an aqueous extract of *Centaurea cyanus* flower is as follows: total phenolic compounds (393 - 485 mg GAE/100 g), total flavonoids (133 - 223 mg QE/100 g), and total anthocyanins (127 - 172 mg cyanidin-3-glucoside equivalent (CGE)/100 g).[9] Additional composition information may be found in Table 3.

The total values of phenolic acid derivatives, phenolic compounds, and flavonoids in a hydromethanolic extract of *Centaurea cyanus* flower were determined to be 4.52, 23.55, and 19.03 mg/g dry weight (dw), respectively.[10] Total composition values of another hydromethanolic extract of *Centaurea cyanus* flower are as follows: organic acids and tocopherols (6.63 and 1.30 g/100 g dw, respectively), phenolic acids, phenolic compounds, anthocyanins, and non-anthocyanin flavonoids (0.134, 38, 27, and 10.7 mg/g extract).[11]

USE

Cosmetic

The safety of the *Centaurea cyanus* flower-derived 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 *Centaurea cyanus* flower-derived ingredients 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.[12] 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, Centaurea Cyanus Flower Extract has the highest frequency of use, and is reported to be used in 800 formulations.[13,14] According to concentration of use data submitted in 2025 in response to the Council survey, Centaurea Cyanus Flower Water has the highest concentration of use, at up to 6.1% in eye makeup removers and at 5% in leave-on face and neck preparations (Table 4).[15]

Some of these ingredients may be incidentally ingested as they are used in products used near the mouth (e.g., Centaurea Cyanus Flower Water is used in lipstick and lip glosses; concentration not reported). In addition, these ingredients may be used near the eye area (e.g., Centaurea Cyanus Flower Water is used in eye makeup remover at up to 6.1%) or result in mucous membrane exposure (e.g., Centaurea Cyanus Flower Water is used in douches; concentration not reported). Lastly, these ingredients are reported to be used in baby products (e.g., Centaurea Cyanus Flower Extract is used in rinse-off "other" baby products at 0.003%).

Cosmetic products containing *Centaurea cyanus* flower-derived ingredients may be incidentally inhaled as they are used in spray (e.g., Centaurea Cyanus Flower Water is used in perfume; concentration not reported) and powder (e.g., Centaurea Cyanus Flower Extract is used in face powders; concentration not reported) formulations. 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. Conservative estimates of inhalation exposures to respirable particles during the use of loose powder cosmetic products are 400-fold to 1000-fold less than protective regulatory and guidance limits for inert airborne respirable particles in the workplace.

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. Additionally, the concentration of use surveys are conducted based on the same product categories as identified in the RLD. Based on RLD, some products containing *Centaurea cyanus* flower-derived ingredients are marketed for use with airbrush delivery systems (e.g., Centaurea Cyanus Flower Extract is used in "other" makeup preparations, airbrush application). However, no consumer habits and practices data or particle size data are publicly available to evaluate the exposure associated with this use type, 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. Accordingly, the data are insufficient to evaluate the exposure resulting from cosmetics applied via airbrush delivery systems.

Centaurea cyanus flower-derived ingredients named in this report are not restricted from use in any way under the rules governing cosmetic products in the European Union.[16]

Non-Cosmetic

Centaurea cyanus is commonly cultivated as a garden plant and has been used in traditional medicine, particularly for its anti-inflammatory properties.[2] The flowers have been used to treat eye diseases, nervous disorders, constipation, and mouth ulcers. The plant has been studied for its ameliorative effects; for example, a study reported that *Centaurea cyanus* flower fraction dose-dependently reduced croton oil-induced edema in mice.[17] In another study, *Centaurea cyanus* intake improved liver structure, reduced hepatic degeneration, and showed hepatoprotective effects in rats that underwent paracetamol-induced liver toxicity.[18]

Centaurea cyanus flowers are also considered to be edible and have been used in tea mixtures, soups, wine, and as a natural food coloring.[2,19] It is reported to be a nutritious plant because of its high dietary fiber content, and the honey made from *Centaurea cyanus* pollen is reported to be antibacterial.[20] A study found that adding *Centaurea cyanus* petals to yogurt can increase the overall protein, fiber, and antioxidant content in the yogurt.

TOXICOKINETIC STUDIES

No relevant toxicokinetics studies on *Centaurea cyanus* flower-derived ingredients were found in the published literature, and unpublished data were not submitted. In general, toxicokinetics data are not expected to be found on botanical ingredients because each botanical ingredient is a complex mixture of constituents.

TOXICOLOGICAL STUDIES

No relevant acute or repeated-dose studies on *Centaurea cyanus* flower-derived ingredients were found in the published literature, and unpublished data were not submitted.

DEVELOPMENTAL AND REPRODUCTIVE TOXICITY STUDIES

No relevant developmental and reproductive toxicity studies on *Centaurea cyanus* flower-derived ingredients were found in the published literature, and unpublished data were not submitted.

GENOTOXICITY STUDIES

No relevant genotoxicity studies on *Centaurea cyanus* flower-derived ingredients were found in the published literature, and unpublished data were not submitted.

CARCINOGENICITY STUDIES

No relevant carcinogenicity studies on *Centaurea cyanus* flower-derived ingredients were found in the published literature, and unpublished data were not submitted.

OTHER RELEVANT STUDIES

Cytotoxicity and Effects on Cell Proliferation

Centaurea Cyanus Flower Extract

Several studies were conducted on porcine liver primary cells (PLP2) treated with hydromethanolic extracts of *Centaurea cyanus* flower (concentrations not stated).[10,11] The half-maximal growth inhibition concentration (GI_{50}) was found to be > 0.4 mg/ml. Sulforhodamine B (SRB) assays performed on breast adenocarcinoma (MCF-7), non-small cell lung cancer (NCI-H460), cervical carcinoma (HeLa), and hepatocellular carcinoma (HepG2) cell lines treated with hydromethanolic extracts of *Centaurea cyanus* flower (exact concentrations not stated; stock solution of 4 mg/ml) did not result in any antiproliferative activity.[10,11]

A trypan blue assay conducted on human acute T leukemia cells (J-45.01) treated with an ethanolic extract of *Centaurea cyanus* flower (0.04 - 1.0 mg/ml) found the half-maximal inhibitory concentration (IC_{50}) of the test substance to be 0.77 mg/ml.[8] An annexin V assay performed on J-45.01 cells treated with an ethanolic extract of *Centaurea cyanus* flower (concentration close to IC_{50} (0.77 mg/ml); exact concentration not stated), resulted in time-dependent apoptosis. An 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay testing the cytotoxic effects of an aqueous extract of *Centaurea cyanus* flower (0.1 - 0.9 mg/ml) in human colorectal adenocarcinoma epithelial (Caco-2), human lung adenocarcinoma epithelial (A459), and HepG2 cells resulted in IC_{50} and GI_{50} values of > 0.9 mg/ml for all treated cell lines.[9]

Centaurea Cyanus Flower Water

No cytotoxicity was found in a cell culture assay performed on PLP2 cells treated with an aqueous infusion of *Centaurea cyanus* flower (concentrations not stated; GI_{50} = > 0.4 mg/ml).[10] An SRB assay performed on MCF-7, NCI-H460, HeLa, and HepG2 cell lines treated with an aqueous infusion of *Centaurea cyanus* flower (exact concentrations not stated; stock solution of 4mg/ml) did not result in any antiproliferative activity.

Centaurea cyanus extract

Mouse macrophages (RAW 264.7) were treated with a methanolic extract of the aerial parts of *Centaurea cyanus* (0.125 – 1 mg/ml) in an MTT assay.[21] No cytotoxicity was observed at any concentration of the test substance.

Anti-Microbial Activity

Centaurea Cyanus Flower Extract

Using microdilution method and rapid *p*-iodonitrotetrazolium chloride (INT) colorimetric assays, the anti-bacterial effects of several hydromethanolic extracts of a *Centaurea cyanus* flower (exact concentrations not stated; stock solution of 100 mg/ml) were tested with gram-negative and gram-positive bacteria.[10,11] The minimum inhibitory concentrations (MIC) ranged from 2.5 - 10 mg/ml for gram-positive and 5 - 20 mg/ml for gram-negative bacteria. No growth inhibition was observed in an antimicrobial activity assay conducted with several strains of gram-negative/positive bacteria and fungi, treated with an aqueous extract of *Centaurea cyanus* flower (0.01 - 1.25 mg/ml).[9]

Centaurea Cyanus Flower Water

Using microdilution method and rapid INT colorimetric assay, the anti-bacterial effect of an aqueous infusion of *Centaurea cyanus* flower (exact concentrations not stated; stock solution of 100 mg/ml) was tested with gram-negative and gram-positive bacteria.[10] The test substances was found to be more active against gram-positive bacteria, with the MIC ranging from 5 to 20 mg/ml for gram-positive and 20 to >20 mg/ml for gram-negative bacteria.

Centaurea cyanus extract

Agar well diffusion and disk diffusion methods were used to test the antibacterial effect of an ethanolic extract of *Centaurea cyanus* (whole plant extract; concentration not stated) on strains of *Escherichia coli* and *Staphylococcus aureus* (ampicillin used as control).[22] The test substance had higher antibacterial effect against *S. aureus* when compared to the control, indicating its effectiveness against gram-positive bacteria.

Anti-Inflammatory Effects

Centaurea cyanus extract

A nitric oxide assay conducted on lipopolysaccharide (LPS)-stimulated RAW 264.7 cells found that treatment with a methanolic extract of the aerial parts of *Centaurea cyanus* (0 - 1 mg/ml) significantly reduced nitric oxide production (IC_{50} = 0.2836 mg/ml), when compared to the control.[21] An enzyme-linked immunosorbent assay (ELISA) and reverse transcription quantitative polymerase chain reaction (RT-qPCR) were used to test the suppressive effects of a methanolic extract of the aerial parts of *Centaurea cyanus* (0 - 1 mg/ml) on the expression of nitric oxide synthase (iNOS), cyclooxygenase-2 (COX-2), interleukin (IL)-6, IL-1β, and tumor necrosis factor-α (TNF-α) in LPS-stimulated RAW 264.7 cells. Following treatment with the test substance, the expression of all the listed enzymes and cytokines were significantly reduced in a dose-dependent manner, when compared to the controls.

DERMAL IRRITATION AND SENSITIZATION STUDIES

No relevant dermal irritation and sensitization studies on *Centaurea cyanus* flower-derived ingredients were found in the published literature, and unpublished data were not submitted.

OCULAR IRRITATION STUDIES

No relevant ocular irritation studies on *Centaurea cyanus* flower-derived ingredients were found in the published literature, and unpublished data were not submitted.

SUMMARY

The safety of 3 *Centaurea cyanus* flower-derived ingredients is reviewed in this safety assessment. According to the *Dictionary*, two of these ingredients are reported to function in cosmetics as skin-conditioning; additional functions are also reported. The *Dictionary* does not report a function for Centaurea Cyanus Flower.

According to RLD obtained from the US FDA in 2025, Centaurea Cyanus Flower Extract has the highest frequency of use and is reported to be used in 800 formulations. Concentration of use data submitted in 2025 indicates that Centaurea Cyanus Flower Water has the highest concentration of use, at up to 6.1% in eye makeup removers and 5% in leave-on face and neck preparations.

Several studies found that hydromethanolic extracts of *Centaurea cyanus* flower did not exhibit cytotoxic or antiproliferative activity in PLP2 cells and various human cancer cells lines (MCF-7, NCI-H460, HeLa, and HepG2). However, treatment with an ethanolic extract of *Centaurea cyanu*s flower resulted in IC_{50} value of 0.77 mg/ml and time-dependent apoptosis in J-45.01 cells. An aqueous extract of *Centaurea cyanu*s flower was found to be non-cytotoxic to several human cancer cell lines (Caco-2, A549, and HepG2).

An aqueous infusion of *Centaurea cyanu*s flower was found to be non-cytotoxic to PLP2 cells. The same aqueous infusion was tested with various human cancer cells lines (MCF-7, NCI-H460, HeLa, and HepG2), and the test substance did not inhibit cell proliferation. RAW 264.7 cells were treated with a methanolic extract of the aerial parts of *Centaurea cyanus.* The assay did not result in any cytotoxic effects.

Hydromethanolic extracts of *Centaurea cyanus* flower demonstrated antibacterial activity, with MIC values ranging from 2.5 - 10 mg/ml against gram-positive bacteria and 5 - 20 mg/ml against gram-negative bacteria. In contrast, an aqueous extract of *Centaurea cyanus* flower did not show antimicrobial activity against the gram-positive, gram-negative, or fungal strains evaluated. The antibacterial effect of an aqueous infusion of *Centaurea cyanu*s flower was tested with gram-negative and gram-positive bacteria. The test substance was found to have increased antibacterial activity against gram-positive bacteria (MIC = 5 - 20 mg/ml). The antibacterial effect of an ethanolic extract of *Centaurea cyanus* (whole plant extract) was tested with strains of *S. aureus* and *E. coli*. The test substance demonstrated strong inhibition of *S. aureus*, when compared to the ampicillin control.

A methanolic extract of the aerial parts of *Centaurea cyanus* significantly reduced nitric oxide production in LPS-stimulated RAW 264.7 cells (IC_{50} = 0.2836 mg/ml), indicating anti-inflammatory activity. ELISA and RT-qPCR analyses further showed that the test substance suppressed the expression of iNOS, COX-2, IL-6, IL-1β, and TNF-α in a significant and dose-dependent manner.

INFORMATION SOUGHT

The following information on these *Centaurea cyanus* flower-derived ingredients as used in cosmetics is being sought for use in the resulting safety assessment:

- Chemical properties and method of manufacturing data
- Further composition and impurities data
- Acute and repeated-dose toxicity data (dermal and inhalation toxicity data)
- Developmental and reproductive toxicity data
- Genotoxicity data
- Dermal irritation and sensitization data at maximum concentration of use

TABLES

Table 1. Definitions and reported functions[1]

Ingredient/CAS No.	Definition	Function(s)
Centaurea Cyanus Flower	Centaurea Cyanus Flower are the flowers of *Centaurea cyanus.*	None Reported
Centaurea Cyanus Flower Extract 84012-18-0	Centaurea Cyanus Flower Extract is the extract of the flowers of the cornflower, *Centaurea cyanus.*	Cosmetic Astringent Skin Protectant Skin-Conditioning Agent - Miscellaneous
Centaurea Cyanus Flower Water	Centaurea Cyanus Flower Water is an aqueous solution of the steam distillate obtained from the flowers of *Centaurea cyanus*.	Skin-Conditioning Agent - Miscellaneous

Table 2. Phytochemical composition of a 70% ethanol extract of *Centaurea cyanus* flower[7]

Compound (type)	% of the total composition
catechol (phenol)	17.79
2-hydroxy-5-methylbenzaldehyde (aldehyde)	9.91
4-((1E)-3-hydroxy-1-propenyl)-2-methoxyphenol (phenol)	1.37
neophytadiene (diterpene)	1.71
14-methyl pentadecanoic acid methyl ester (ester)	0.37
palmitic acid (fatty acid)	8.76
phytol (diterpene alcohol)	4.15
linolenic acid (fatty acid)	8.02
2-monopalmitin (alcohol)	4.49
1-monolinolein (glyceride)	4.34
stigmasterol (sterol)	4.87
γ-sitosterol (sterol)	8.64
β-amyrin (triterpene)	9.33
α-amyrin (triterpene)	12.86
vitamin E acetate (vitamin)	3.39

Table 3. Composition of an aqueous extract of *Centaurea cyanus* flower[9]

Compound	Content (mg/100g)
chlorogenic acid	3897
caffeic acid	1.6
isoquercitrin	116
p-coumaric acid	1.3
ferulic acid	1.4
coumarin	1.5

Table 4. Frequency and concentration of use according to likely duration and exposure and by product category[13-15]

	Centaurea Cyanus Flower		Centaurea Cyanus Flower Extract		Centaurea Cyanus Flower Water	
	# of Uses	Max Conc of Use	# of Uses	Max Conc of Use	# of Uses	Max Conc of Use
	RLD (2025)	% (2025)	RLD (2025)	% (2025)	RLD (2025)	% (2025)
Totals*	**198**	**0.001**	**800**	**0.00001 – 0.075**	**494**	**0.5 – 6.1**
summarized by likely duration and exposure**						
Duration of Use						
Leave-On	*173*	*NR*	*692*	*0.00001 – 0.075*	*439*	*0.5 - 5*
Rinse-Off	*97*	*0.001*	*258*	*0.001 – 0.01*	*102*	*3.6 – 6.1*
Diluted for (Bath) Use	*13*	*NR*	*5*	*NR*	*NR*	*NR*
Unknown	*2*	*NR*	*13*	*NR*	*3*	*NR*
Exposure Type						
Baby Products	1	NR	5	0.003	4	NR
Children's Makeup	NR	NR	NR	NR	NR	NR
Eye Area	4	NR	75	0.00001 – 0.075	258	0.5 – 6.1
Incidental Ingestion	3	NR	NR	NR	15	NR
Mucous Membrane	30	NR	28	NR	37	NR
Incidental Inhalation-Spray	1; 76[a]; 95[b]	NR	1; 294[a]; 337[b]	0.001[a]	6; 42[a]; 97[b]	NR
Incidental Inhalation-Airbrush	NR	NR	1	NR	NR	NR
Incidental Inhalation-Powder	95[b]; 1[c]	NR	6; 337[b]; 2[c]	0.0068[c]	97[b]; 2[c]	NR
Dermal Contact	258	NR	828	0.00001 – 0.075	488	0.5 – 6.1
Deodorant (underarm)	NR	NR	NR	NR	NR	NR
Hair - Non-Coloring	14	0.001	103	NR	18	NR
Hair-Coloring	NR	NR	12	0.0011	2	NR
Nail	7	NR	3	NR	NR	NR
Other Preparations (Unknown Exposure Type)	2	NR	13	NR	3	NR
as reported by product category						
Baby Products						
Baby Shampoos					1	NR
Baby Lotions/Oils/Powders/Creams	1	NR	2	NR	2	NR
Other Baby Products			3 (r.o.)	0.003 (r.o.)	1 (r.o.)	NR
Bath Preparations (diluted for use)						
Bath Oils, Tablets, and Salts	7	NR	2	NR		
Bubble Baths			1	NR		
Other Bath Preparations	6	NR	2	NR		
Eye Makeup Preparations (not children's)						
Eyeliner			5	0.075	1	0.5
Eye Shadow			23	NR	209	0.5
Eye Lotion	1	NR	8	0.00001 – 0.0014	2	NR
Eye Makeup Remover	1	NR	15	0.01	22	5 – 6.1
Mascara	1	NR	9	0.015	17	1
Eyelash and Eyebrow Preparations (primers, conditioners, serums, fortifiers)			4	NR	2	NR
Other Eye Makeup Preparations	1	NR	11	NR	5	0.5
Fragrance Preparations						
Perfumes					3	NR
Other Fragrance Preparation	1	NR	1	NR	3	NR
Hair Preparations (non-coloring)						
Hair Conditioners	1 (l.o.); 3 (r.o.)	NR	11 (l.o.); 13 (r.o.)	NR	2 (l.o.); 3 (r.o.)	NR
Hair Straighteners			3	NR		
Rinses (non-coloring)			3	NR		

Table 4. Frequency and concentration of use according to likely duration and exposure and by product category[13-15]

	Centaurea Cyanus Flower		Centaurea Cyanus Flower Extract		Centaurea Cyanus Flower Water	
	# of Uses	Max Conc of Use	# of Uses	Max Conc of Use	# of Uses	Max Conc of Use
	RLD (2025)	% (2025)	RLD (2025)	% (2025)	RLD (2025)	% (2025)
Shampoos (non-coloring)	3 (r.o.)	0.001	25 (r.o.)	NR	4 (r.o.)	NR
Tonics, Dressings, Other Hair Grooming Aids	5	NR	21	NR	6	NR
Wave Sets					1	NR
Other Hair Preparations	1 (l.o.); 1 (r.o.)	NR	17 (l.o.); 10 (r.o.)	NR	1 (l.o.)	NR
Hair Coloring Preparations						
Hair Dyes and Colors (all types requiring caution statements and patch tests)			11		2	NR
Hair Rinses (coloring)			NR	0.0011 (r.o.)		
Hair Shampoos (coloring)			1 (r.o.)	0.0011 (r.o.)		
Makeup Preparations (not eye or children's)						
Blushers and Rouges (all types)			1	NR	15	NR
Face Powders			6	NR		
Foundations	4 (traditional application)	NR	22 (traditional application)	NR	2 (traditional application)	NR
Lipsticks and Lip Glosses	3	NR			15	NR
Makeup Bases	2 (traditional application)	NR	10 (traditional application)	0.0075 (traditional application)	4 (traditional application)	NR
Makeup Fixatives	2	NR	7	NR		
Other Makeup Preparations	6 (traditional application)	NR	10 (traditional application); 1 (airbrush)	NR	28 (traditional application)	NR
Manicuring Preparations						
Nail Creams and Lotions	6	NR	3	NR		
Other Manicuring Preparations	1	NR				
Personal Cleanliness						
Bath Soaps and Body Washes	11	NR	15	NR	18	NR
Douches					1	NR
Disposable Wipes	1 (l.o.)	NR	3 (l.o.)	NR		
Other Personal Cleanliness Products	2 (r.o.)	NR	3 (l.o.); 2 (r.o.)	NR	3 (r.o.)	NR
Shaving Preparations						
Aftershave Lotions	1	NR	1	NR	2	NR
Pre-shave Lotions (all types)					2	NR
Shaving Cream (aerosol, brushless, lather)			3	NR		
Skin Care Preparations						
Cleansing	27	NR	77	0.01	29	3.6 – 5.8
Depilatories	1	NR	2	NR		
Face and Neck (excluding shaving preps)	58 (l.o.); 22 (r.o.)	NR	190 (l.o.); 47 (r.o.)	0.0068 (l.o.; not spray)	63 (l.o); 3 (r.o.)	5 (l.o.; not spray); 3.6 (r.o.; not spray)
Body and Hand (excluding shaving preps)	10 (l.o.); 3 (r.o.)	NR	74 (l.o.); 13 (r.o.)	0.0068 (l.o.; not spray)	10 (l.o.); 2 (r.o.)	NR
Foot Powders and Sprays					2	NR
Moisturizing	29	NR	197	0.0014 (not spray)	28	NR
Night	1	NR	9	NR	1	NR
Paste Masks (mud packs)	19	NR	5	0.0014	3	NR
Skin Fresheners	16	NR	8	NR	1	NR
Other Skin Care Preparations	21 (l.o.); 4 (r.o.)	NR	35 (l.o.); 10 (r.o.)	0.001 (r.o.)	15 (l.o.); 7 (r.o.)	NR
Other Preparations (i.e., those that do not fit another category)	2	NR	13	NR	3	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
[c] It is possible these products are powders, but it is not specified whether the reported uses are powders.

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