Australian Government
Department of Health, Disability and Ageing
Australian Industrial Chemicals Introduction Scheme

Phenol, 4-(butoxymethyl)-2-methoxy-

Assessment statement (CA09909)

28 April 2026

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AICIS assessment (CA09909)

Chemical in this assessment

Name	CAS registry number
Phenol, 4-(butoxymethyl)-2-methoxy-	82654-98-6

Reason for the assessment

An application for an assessment certificate under section 31 of the *Industrial Chemicals Act 2019* (the Act).

Certificate application type

AICIS received the application in a Very Low to Low Risk type.

Defined scope of assessment

The chemical has been assessed:

- as imported into Australia at up to 0.1 tonne/year
- as imported in finished end use products for end use in personal care products (cosmetics) except oral care products - at up to 0.1% concentration
- for use by professional workers and for consumer end use

Summary of assessment

Summary of introduction, use and end use

The assessed chemical has functional use as a fragrance. The assessed chemical will not be manufactured in Australia. It will be imported as a component of finished end use products. The assessed chemical has end use in personal care products (cosmetics) except oral care products. The proposed maximum use concentration in these products is up to 0.1%.

The end use products containing the assessed chemical are proposed to be used by professional workers and consumers.

Human health

Summary of health hazards

The submitted toxicological data on the assessed chemical (see **Supporting information** section) indicate that the assessed chemical is:

- of low acute oral and dermal toxicity
- not likely to be genotoxic

- not expected to cause systemic effects following repeated exposure (up to 600 mg/kg bw/day in rats)

The toxicological information also indicates that the assessed chemical:

- may cause drowsiness or dizziness
- is slightly irritating to the skin
- is irritating to the eyes
- is sensitising to the skin

Based on the results of the submitted acute dermal study in rats, the assessed chemical may cause damage to the skin (necrosis) after 24 hours exposure at 2,000 mg/kg bw. However, it is noted in the skin irritation study in rabbits that the assessed chemical is slightly irritating to the skin after 4 hours exposure at 100% concentration (see **Supporting information** section).

The assessed chemical was positive in an *in vitro* mammalian chromosome aberration test with and without metabolic activation. However, the assessed chemical was negative in an *in vitro* Ames test and in an *in vivo* mammalian micronucleus test conducted on the bone marrow of mice. Considering all the *in vitro* and *in vivo* results, the assessed chemical is likely to be non-genotoxic.

No inhalation toxicity data were provided for the assessed chemical.

Hazard classifications relevant for worker health and safety

Based on the data provided by the applicant, the assessed chemical satisfies the criteria for classification according to the *Globally Harmonized System of Classification and Labelling of Chemicals* (GHS) (UNECE 2017) for hazard classes relevant for worker health and safety as adopted for industrial chemicals in Australia.

Health hazards	Hazard category	Hazard statement
Serious eye damage/eye irritation	Eye Irrit. 2A	H319: Causes serious eye irritation
Skin sensitisation	Skin Sens. 1B	H317: May cause an allergic skin reaction
Specific target organ toxicity (single exposure)	STOT Single Exp. 2	H371: May cause damage to skin through dermal exposure
Specific target organ toxicity (single exposure)	STOT Single Exp. 3	H336: May cause drowsiness or dizziness

Summary of health risk

Public

There will be widespread and repeated exposure of the public to the assessed chemical at up to 0.1% concentration when using a wide range of cosmetic products containing the assessed chemical. The principal route of exposure will be dermal and inhalation, while incidental oral or ocular exposure is also possible. Inhalation exposure occurs particularly from the use of products applied by spray.

The assessed chemical is irritating to the eyes, may cause damage to the skin (necrosis) through longer dermal exposure and may cause drowsiness and dizziness. The assessed

chemical is a weak skin sensitiser based on the results of a guinea pig maximisation test (GPMT) study. A quantitative risk assessment (QRA) could not be conducted as a potency value (such as EC3) is not available. As a result, the maximum skin sensitisation induction concentrations for different end use products to derive safe use levels could not be determined. However, eye irritation, skin sensitisation, skin damage and narcotic effects are not expected to occur from use of the assessed chemical at the proposed low end use concentrations in cosmetics (up to 0.1%).

No inhalation toxicity data are provided for the assessed chemical. Taking hairspray as a worst-case scenario example for inhalation exposure assessment, the systemic exposure is estimated to be up to 4 µg/kg bw/day (see **Supporting information** section). Inhalation exposure to the assessed chemical from use of cosmetic products, especially the products applied by spray may also occur. However, due to low concentrations of the assessed chemical in the end use products, it is not expected to pose health risk through inhalation when the assessed chemical is used according to the assessed use scenarios.

Based on the QRA for the worst-case scenario, consumers simultaneously using multiple cosmetic products could be systemically exposed to the assessed chemical at approximately 248 µg/kg bw/day through repeated or prolonged exposure (see **Supporting information** section). Considering the low systemic exposure level to the assessed chemical, health risks from repeated exposure to the public are not expected.

This assessment does not identify any risks to public health that require specific risk management measures.

Workers

Professional workers using end use products including those in cosmetic businesses may experience exposure via dermal, inhalation and accidental ocular exposure to the assessed chemical up to a concentration of 0.1%. The professional workers may wear some PPE (including gloves, coveralls and face masks or safety glasses). If PPE is used, exposure of such workers is expected to be of a similar or lesser extent than that experienced by consumers using the same end use products containing the assessed chemical.

This assessment does not identify any risks to workers that require specific risk management measures.

Environment

Summary of environmental hazard characteristics

According to the *Australian Environmental Criteria for Persistent, Bioaccumulative and/or Toxic Chemicals* (DCCEEW, 2022) and based on the available data, the assessed chemical is:

- Persistent (P)
- Not Bioaccumulative (Not B)
- Not Toxic (Not T)

Environmental hazard classification

The assessed chemical satisfies the criteria for classification according to the GHS for environmental hazards (UNECE, 2017) as follow. Considerations were also made for the persistence of the assessed chemical.

Environmental Hazard	Hazard Category	Hazard Statement
Hazardous to the aquatic environment (acute / short-term)	Aquatic Acute 3	H402: Harmful to aquatic life
Hazardous to the aquatic environment (long-term)	Aquatic Chronic 3	H412: Harmful to aquatic life with long lasting effects

Summary of environmental risk

The assessed chemical will be introduced as a fragrance ingredient for use in a variety of personal care (cosmetics) except oral care products. These uses may result in the release of the assessed chemical to sewers or to air.

The assessed chemical is not readily degradable and is categorised as persistent. The assessed chemical does not have potential for bioaccumulation. The assessed chemical is not expected to cause toxic effects in aquatic organisms.

Although the assessed chemical is persistent, according to the *Australian Environmental Criteria for Persistent, Bioaccumulative and/or Toxic Chemicals* (DCCEEW, 2022), it does not meet all three PBT criteria. It is hence unlikely to have unpredictable long-term hazard impact to the environment, and its risk may be estimated by the risk quotient method (RQ = PEC ÷ PNEC).

Based on the calculated RQ values < 1 for the river and ocean compartments, it is expected that the environmental risk from the introduction of the assessed chemical can be managed.

Means for managing risk

Workers

Recommendation to Safe Work Australia

- It is recommended that Safe Work Australia (SWA) update the *Hazardous Chemical Information System* (HCIS) to include classifications relevant to work health and safety (see **Hazard classifications relevant for worker health and safety**).

Information relating to safe introduction and use

- No specific recommendations for the introduction and use of the assessed chemical are required when the assessed chemical is introduced and used in accordance with the terms of the assessment certificate.

Conclusions

The Executive Director is satisfied that the risks to human health or the environment associated with the introduction and use of the industrial chemical can be managed.

Note:

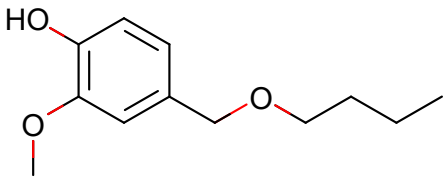
1. Obligations to report additional information about hazards under s 100 of the *Industrial Chemicals Act 2019* apply.
2. A person introducing this chemical should be aware of their obligations under environmental, workplace health and safety and poisons legislation as adopted by the relevant state or territory.

Supporting information

Chemical identity

CAS number	82654-98-6
CAS name	Phenol, 4-(butoxymethyl)-2-methoxy-
Molecular formula	$C_{12}H_{18}O_3$
Molecular weight (g/mol)	210.27
SMILES (canonical)	OC1=CC=C(C=C1OC)COCCCC

Structural formula



Additional chemical information

The assessed chemical is a discrete chemical with a typical purity of 100%.

Relevant physical and chemical properties

Physical form	Colourless liquid	
Freezing point	-78	°C
Boiling point	300-301	°C at 101.3 kPa (est.)
Density	1060	kg/m^3 at 20 °C
Vapour pressure	4.2 × 10^{-4}	kPa at 20 °C
Water solubility	1.69	g/L at 20 °C
Flash Point	153	°C at 101.3 kPa
Auto flammability	295	°C
Hydrolysis	$t_{1/2}$ = 94 $t_{1/2}$ = 105 $t_{1/2}$ = 82	days at pH 4 and 25 °C days at pH 7 and 25 °C days at pH 9 and 25 °C
Ionisable in the environment	yes	
pK_a	9.84	at 20 °C

log K_{ow}	2.2	at 22.5 °C
Surface tension	43.5	mN/m at 20°C

Human exposure

Public

Dermal exposure of the public to the assessed chemical at a maximum concentration of 0.1% will be wide-spread and frequent across the use of a variety of cosmetic products. Incidental oral, ocular or respiratory exposure to the chemical at a maximum concentration of 0.1% may also be possible.

Dermal exposure

Data on typical use patterns of product categories in which the assessed chemical may be used on a daily basis are shown in the following tables and these are based on information provided in various literatures (SCCS 2012; Cadby et al. 2002; ACI 2010; Loretz et al. 2006). For the purposes of exposure assessment, Australian use patterns for the various product categories are assumed to be similar to those in Europe. A dermal absorption (DA) rate of 100% is assumed for the assessed chemical and an average body weight (BW) of 60 kg is used for male and female adults for calculation purposes.

Cosmetic products

Product type	Amount (mg/day)	C (%)	RF	Daily systemic exposure (mg/kg bw/day)
Body lotion	7820	0.1	1	0.131
Face cream	1540	0.1	1	0.026
Hand cream	2160	0.1	1	0.036
Fine fragrances	750	0.1	1	0.013
Deodorant (non-spray)	1500	0.1	1	0.025
Shampoo	10460	0.1	0.01	0.002
Conditioner	3920	0.1	0.01	0.001
Shower gel	18670	0.1	0.01	0.003
Hand soap	20000	0.1	0.01	0.003
Hair styling products	4000	0.1	0.1	0.007
Total				**0.245**

C = maximum intended concentration of assessed chemical; RF = retention factor
Daily systemic exposure = (Amount × C × RF × DA)/BW

Inhalation exposure

Hairspray is taken as a worst-case scenario example for the inhalation exposure assessment. A 2-zone approach (Steiling et al. 2014; Rothe et al. 2011; Earnest Jr. 2009) and an adult inhalation rate of 20 m^3/day (enHealth 2012) are used in the calculation. It is conservatively assumed that the fraction of the assessed chemical inhaled is 50%.

Amount of hairspray applied	9.89	g/day
Maximum intended concentration of the chemical	0.1	%
Inhalation rate of the user	20	m^3/day
Exposure duration in zone 1	1	minutes
Exposure duration in zone 2	20	minutes
Fraction inhaled by the user	50	%
Volume of zone 1	1	m^3
Volume of zone 2	10	m^3
Daily systemic exposure	0.004	mg/kg bw/day

C = maximum intended concentration of assessed chemical
Total daily systemic exposure = Daily systemic exposure in zone 1 [(amount × C × inhalation rate × exposure duration (zone 1) × fraction inhaled)/(volume (zone 1) × body weight)] + Daily systemic exposure in zone 2 [(amount × C × inhalation rate × exposure duration (zone 2) × fraction inhaled)/(volume (zone 2) × body weight)]

It is acknowledged that inhalation exposure to the assessed chemical from use of other cosmetic products may also occur.

Overall systemic exposure

The worst-case scenario estimation using these assumptions is for a person who is a simultaneous user of all products listed in the above tables that contain the assessed chemical at the maximum intended concentrations specified for various product types. This would result in a combined internal dose of 0.248 mg/kg bw/day for the assessed chemical. It is considered that the combination of the conservative hair spray inhalation exposure assessment parameters, and the aggregate exposure from use of the dermally applied products, which assumes a conservative 100% dermal absorption rate, is sufficiently protective to cover additional inhalation exposure to the assessed chemical from use of other spray cosmetic products with lower exposure factors.

Health hazard information

Acute toxicity

Oral

In an acute oral toxicity study (OECD TG 423), 6 Wistar rats (n = 3/sex) were administered a single dose of the assessed chemical at 2,000 mg/kg bw. No mortalities or macroscopic findings were observed in any treated animals. Abnormal clinical signs observed included:

- lethargy (5/6), hunched posture (5/6), ventro-lateral recumbency (4/6) and uncoordinated movements (4/6) in both sexes on day 1 observation
- piloerection in 2 females on day 1 observation
- scabs and alopecia on the neck of a male on day 2 observation, with the alopecia persisting until the end of the study
- rales in one male on the day 3 observation

Body weight gain appeared normal. The median lethal dose (LD50) was determined to be greater than 2,000 mg/kg bw. Based on the results of this study, the assessed chemical may cause narcotic effects (e.g. lethargy and uncoordinated movements) warranting hazard classification for Specific target organ toxicity (single exposure) Category 3 (H336: May cause drowsiness or dizziness) according to GHS criteria as adopted in Australia for industrial chemicals.

Dermal

In an acute dermal toxicity study (OECD TG 402), a single dose of the assessed chemical at 2,000 mg/kg bw was applied (semi-occlusive for 24 hours) on the intact skin of 10 Wistar rats (n = 5/sex). No mortalities or signs of systemic toxicity were observed. Abnormal clinical signs observed included:

- ptosis (2/5) in males at the 4-hour observation
- lethargy (10/10), hunched posture (9/10) and/or chromodacryorrhoea (9/10) in both sexes on the day 1 observation until the day 3 observation
- uncoordinated movements (1/5) and piloerection (2/5) in males on day 2 observation
- necrosis on the treated site or back (3/5) of females from day 2 observation until day 4 observation
- focal erythema and/or scabs on the treated site of all treated females from day 2 observation until the day 9 observation
- scales on the treated site or back (4/5) of females from the day 5 observation until the day 10 observation

All treated skin sites appeared normal by the day 11 observation in females and day 4 observation in males. Very slight erythema in 2 females was observed at the day 9 observation. There were no treatment-related macroscopic findings. Body weight gain was normal. The LD50 was determined to be greater than 2,000 mg/kg bw.

Based on the results of this study, the assessed chemical may cause narcotic effects (e.g. lethargy and uncoordinated movements) warranting hazard classification for Specific target organ toxicity (single exposure) Category 3 (H336: May cause drowsiness or dizziness) according to GHS criteria as adopted in Australia for industrial chemicals.

The treated animals also showed severe skin effects (necrosis, focal erythema and/or scabs that reversed by day 10) warranting classification of the assessed chemical for Specific target organ toxicity (single exposure) Category 2 (H371: May cause damage to skin through dermal exposure) according to GHS criteria as adopted in Australia for industrial chemicals.

Corrosion/Irritation

Skin irritation

In an *in vivo* skin irritation test (OECD TG 404), a single dose of the test substance at 0.5 mL was applied to the intact skin of three female New Zealand White rabbits (semi-occlusive) for 4 hours. No mortalities or signs of systemic toxicity were observed. Well-defined erythema (maximum score of 2) was observed in the treated sites of all animals at the 1-hour observation. Very slight oedema was observed in all treated animals at the 24-hour observation. The mean individual erythema scores and oedema scores from gradings at 24, 48 and 72 hours were 1.3, 1.3, 1.3 and 0.7, 0.7, 1.0, respectively. Erythema at the edge of the application site or scaliness of the skin was noted in all animals on the 72-hour observation, with the latter persisting until the day 7 observation. At the day 21 observation, the skin of all animals appeared normal. However, it is noted that no skin reaction observations were recorded from day 7 to day 21.

Under the conditions of this study, the assessed chemical was slightly irritating to skin but does not meet the GHS criteria for classification as a skin irritant. However, scaliness of the skin was reported in all animals until the day 7 observation, supporting the classification for Specific target organ toxicity (single exposure) Category 2 (H371: May cause damage to skin through dermal exposure) as concluded in the acute dermal toxicity study.

Eye irritation

In an eye irritation test (OECD TG 405), a single dose of the assessed chemical (0.1 mL) was applied to one eye of three female New Zealand White rabbits. At the 1-hour observation, very slight corneal opacity in 2 rabbits (maximum score of 1) and iridial irritation (maximum score of 1) and slight conjunctival irritation, chemosis and discharge (maximum score of 2) in treated eyes of all rabbits were observed. At the day 14 observation, the treated eyes of all animals appeared normal. The mean individual scores at 24, 48 and 72 hours were 3, 2, 2 for conjunctival redness and 1.0, 0.0 1.0 for corneal opacity, warranting classification of the assessed chemical for eye irritation Category 2A (H319: Causes serious eye irritation) according to the GHS criteria as adopted in Australia for industrial chemicals.

Sensitisation

Skin sensitisation

The skin sensitisation potential of the assessed chemical was tested using 10 guinea pigs in a guinea pig maximisation test (GPMT; OECD TG 406). Following preliminary tests, an intradermal induction concentration of 5% and topical induction concentration of 100% were used, with a single topical application at 100% concentration used for challenge after a 14-day rest period following induction. Slight erythema was present in 8/10 animals at 24-hours after challenge and in 7/10 animals at the 48-hours after challenge. Yellow staining of the test site was observed in all treated animals at the 24-hour time point and 1/10 animals at the 48-hour time point. Under the conditions of the study, the assessed chemical is sensitising to the skin.

The assessed chemical was also determined to be sensitising to the skin in another GPMT (similar to OECD TG 406). The inductions were conducted using intradermal injection and topical application at 10% concentration. The test animals were later challenged by topical applications at 2%, 5%, 10% and 20% concentrations. Very slight to moderate erythema was present in 2/5 animals at 48-hours after challenge at 20% concentration. Very slight erythema was observed in 1/5, 1/5 and 2/5 animals at 48-hours after challenge at 2%, 5%, 10% concentration, respectively.

Based on the results of these studies, the assessed chemical is sensitising to the skin warranting hazard classification for skin sensitisation Category 1B (H317: May cause an allergic skin reaction) according to GHS criteria as adopted in Australia for industrial chemicals.

Repeat dose toxicity

In a range finding study, the assessed chemical was administered by oral gavage to Wistar rats (n = 3/sex/dose) for 5 consecutive days at 0, 150 and 1,000 mg/kg bw/day. Increased salivation was observed in both dose groups. Uncoordinated movements (3/3), hunched posture (2/3), brown staining of the snout (2/3), laboured respiration (2/3) and piloerection and/or emaciation (2/3) were observed in the high dose group. Reduced body weight gain and lower food consumption were observed in high dose animals of both sexes. Necropsy revealed slightly reduced liver weights in high dose females. No test substance-related abnormalities were observed at macroscopic examinations of organs. Based on the results of this study, dose levels of 35, 150, and 600 mg/kg bw/day were selected for further investigation.

In a repeated dose oral toxicity study (OECD TG 407), the assessed chemical was administered to Wistar rats (n = 5/sex/dose) by oral gavage for 28 days at dose levels of 0, 35, 150, and 600 mg/kg bw/day.

No treatment-related changes in water consumption, behavioural parameters, functional performance, sensory reactivity and haematology were observed in the animals at up to 600 mg/kg bw/day.

Clinical signs of toxicity included scabs and wounds on the neck (1/5 mid dose male), alopecia (1/5 low dose female), breathing rales (2/5 high dose males and 1/5 high dose female), hunched posture (1/5 low dose female and 2/5 mid dose females) and salivation (all treated animals). These effects were considered not treatment-related by the study authors.

Slight reductions in body weight were observed in mid-dose (-3.6%) and high dose (-4.3%) males. A statistically significant reduction in the mean body weight of high-dose males (-9.4%) in comparison to control was observed on day 22. A slight increase in relative food consumption (15.6%) was observed in high dose males at the end of the study; however, the study authors stated that increased food consumption was likely caused by the reduced body weight.

In comparison to control groups, there were increases in mean liver weights (absolute 8.4% and relative 14.1%) in high dose males and increases in mean kidney weights in low dose females (absolute and relative 13.2% and 7.9%, respectively), low dose males (19.0% and 14.7%, respectively) and high-dose males (9.3% and 14.7%, respectively). However, the study authors reported these effects as not toxicologically relevant due to lack of dose-responses.

Macroscopic examinations revealed red foci on the lungs (1 control male and 1/5 low dose male), red discolouration of the mandibular lymph nodes (1/5 mid dose male), exophthalmos of the left eye (1/5 mid dose male), a constricted spleen (1/5 high dose male) and alopecia on

the right foreleg (1/5 low dose female). Due to lack of dose-responses, the study authors considered these findings as incidental and not toxicologically relevant.

Minimal to slight degrees of squamous hyperplasia in the forestomach of high dose animals (2/5 males and 1/5 females), minimal to slight glandular or forestomach inflammation and other microscopic observations were reported in treated rats; however, these were reported as within the historical control ranges for this strain of rats.

In the mid dose group, there were statistically significant increases or decreases of some clinical chemistry parameters (mean potassium levels increased by 9.1% in males, mean sodium levels decreased in females by 1.3%, mean albumin levels increased by 7.6%). However, these were within the historical control data for this strain of rats.

The no observed adverse effect level (NOAEL) for systemic toxicity is established as 600 mg/kg bw/day.

Genotoxicity

In vitro

The assessed chemical was found to be not mutagenic in an *in vitro* bacterial reverse mutation assay (Ames test) using *Salmonella typhimurium* strains TA98, TA100, TA1535, TA1537 and *Escherichia coli* strain WP_2uvrA, with or without metabolic activation (OECD TG 471). For TA100, toxicity was seen at concentrations ≥ 2,000 µg/plate with metabolic activation and ≥ 3,330 µg/plate without metabolic activation. For TA98, TA1535, TA1537 and WP2uvrA, toxicity was seen at concentrations ≥ 3,330 µg/plate with and without metabolic activation. Precipitation was observed at concentrations ≥ 3,330 µg/plate for TA100 and WP2uvrA and at ≥ 5000 µg/plate for TA98, TA1535 and TA1537. No significant increases in the frequency of revertant colonies were recorded for any of the bacterial strains at up to 3,330 µg/mL for TA98, TA100, TA1535, TA1537 and at up to 5,000 µg/mL for WP2uvrA, with or without metabolic activation.

In an *in vitro* mammalian chromosome aberration test (OECD TG 473), the assessed chemical was found to be clastogenic in cultured peripheral human lymphocytes with metabolic activation. The concentrations used in the main experiments (up to 600 µg/mL with metabolic activation, and up to 625 µg/mL without metabolic activation) were based on data from a preliminary test. Following the 3-hour treatment, the assessed chemical induced a statistically significant increase in the number of cells with chromosome aberrations at the highest tested, cytotoxic concentration of 525 µg/ml with metabolic activation and at all tested concentrations from 500 µg/ml without metabolic activation.

In vivo

In an *in vivo* mammalian erythrocyte micronucleus test (OECD TG 474), Crj:CD-1 ICR mice (n = 5/sex/dose) were administered the assessed chemical (in olive oil) orally twice (in 24-hour intervals) at 0, 250, 500 and 1,000 mg/kg bw in males and 0, 500, 1,000 and 2,000 mg/kg bw in females (oral administration route not specified). General toxicity effects (such as decreased spontaneous locomotion) were observed in treated animals confirming that the chemical reached the bone marrow. No statistically significant increases in the frequency of polychromatic erythrocytes with or without micronuclei was detected in the bone marrow of the mice exposed to the test substance in comparison to the control. Under the conditions of the study, the chemical was considered non genotoxic.

It is noted that the assessed chemical was negative in an *in vitro* Ames test and positive in inducing chromosomal aberrations in an *in vitro* mammalian chromosome aberration test with and without metabolic activation. The assessed chemical was negative for clastogenicity in an *in vivo* mammalian micronucleus test conducted on the bone marrow of mice. Considering all the *in vitro* and *in vivo* results, the assessed chemical is likely to be non genotoxic.

Environmental exposure

The assessed chemical will be imported into Australia in finished end-use products. Significant releases of the assessed chemical to the environment are not expected during transport or storage.

Consumer and professional end use of the assessed chemical from the specified end use is expected to result in the release of the assessed chemical “down the drain” and into the sewers. Consequently, the assessed chemical will be treated at sewage treatment plants (STPs) before release to surface waters.

Environmental fate

Partitioning

The assessed chemical is readily soluble in water (solubility = 1.69 g/L at 20 °C) and has low measured octanol/water partition coefficient (log K_{ow} =2.2). The assessed chemical is expected to remain in aquatic compartment when entering water environments.

The calculated log K_{oc} = 1.9 indicates the assessed chemical is highly mobile in soil if entering soils.

The assessed chemical is expected to be surface active based on the measured surface tension of 43.5 mN/m. Therefore, it has potential to accumulate at the surface of particles in water or soil surface.

Degradation

The assessed chemical is considered persistent based on the measured degradation values in water.

Results of the hydrolysis study indicated that the assessed chemical is hydrolytically stable, as indicated by the measured half-lives of 94, 105 and 82 days at 25 °C, pH 4, 7 and 9, respectively. A ready biodegradation test, conducted according to OECD TG 301B, showed 48.5% degradation of the assessed chemical in 29 days.

Based on these results, the assessed chemical is classified as not readily biodegradable and appears to be persistent.

Bioaccumulation

Based on the measured low log K_{OW} value, the assessed chemical does not have the potential to bioaccumulate.

No bioaccumulation information was provided for the assessed chemical. The experimental octanol/water partition coefficient of the assessed chemical (log K_{OW} = 2.2) is below the domestic bioaccumulation threshold of log K_{OW} = 4.2 (DCCEEW, 2022).

Predicted environmental concentration (PEC)

A predicted environmental concentration (PEC) for Australian waters was calculated assuming 100% of the introduction volume is released into sewage treatment plants (STP) over 365 days per annum. The extent to which the assessed chemical is removed from the effluent in STP processes is based on its physicochemical properties and biodegradability, modelled by SimpleTreat 4.1 (Struijs 2014) which has been adjusted to suit Australian STP conditions.

In Australia, about 20% of sewage is treated to primary levels which then discharged to ocean, and 80% of Australian sewage is treated to at least secondary levels which then discharged to both ocean and rivers (Blue Environment 2020). Removal at the primary stage, and total removal percentages were calculated. A dilution factor of 1 was applied to river discharge and a dilution factor of 10 was applied to ocean discharge (EPHC 2009). PEC calculations for river and ocean discharges are summarised in the table below:

Total Annual Import Volume	100	kg/year
Proportion expected to be released to sewer	100	%
Days per year where release occurs	365	days/year
Emission rate	0.27	kg/day
Water use	200	L/person/day
Population of Australia	25.423	Million
Removal from primary treatment	0.72	% Mitigation
Removal from secondary treatment	1.17	% Mitigation
Daily effluent production	5,085	ML/day
PEC - River	0.05	µg/L
PEC - Ocean	0.01	µg/L

Environmental effects

Effects on aquatic life

Acute toxicity

The following measured median lethal concentration (LC50) and median effective concentration (EC50) values for model organisms were supplied for the assessed chemical:

Taxon	Endpoint	Method
Fish	96 h LC50 = 19 mg/L	*Cyprinus carpio* (Carp) OECD TG 203 Static conditions Nominal concentration
Invertebrate	48 h EC50 = 29 mg/L	*Daphnia magna* (water flea) Immobility OECD TG 202 Static conditions Nominal concentration
Algae	72 h ErC50 = 212 mg/L	*Selenastrum capricornutum* (green algae) Growth inhibition OECD TG 201 Static Conditions Nominal concentration

Chronic toxicity

The following measured 10th percentile effective concentration (EC10) value for algae was provided for the assessed chemical:

Taxon	Endpoint	Method
Algae	72 h ErC10 = 12 mg/L	*Selenastrum capricornutum* (green algae) Growth inhibition OECD TG 201 Static Conditions Nominal concentration

Effects on sediment dwelling life

The results from the assessed chemical for sediment toxicity are summarised in the table below:

Taxon	Endpoint	Method
Microorganisms	30 min EC50 > 100 mg/L	Bacteria Respiration inhibition OECD TG 209 Nominal concentration

Predicted no-effect concentration (PNEC)

A predicted no-effect concentration (PNEC) of 190 µg/L was calculated for the assessed chemical in the aquatic environment. This value was derived using the most conservative endpoint value for fish (96 hLC50 = 19 mg/L). An assessment factor of 100 was applied to this endpoint as acute toxicity data were available for three trophic levels and chronic toxicity data were incomplete (EPHC, 2009). The acute endpoint was selected, over the algal chronic

endpoint, in the absence of additional chronic endpoints to support the algal growth rate EC10 (ECHA 2008).

Categorisation of environmental hazard

The categorisation of the environmental hazards of the assessed chemical according to the *Australian Environmental Criteria for Persistent, Bioaccumulative and/or Toxic Chemicals* (DCCEEW, 2022) is presented below:

Persistence

Persistent (P). Based on the biodegradation measured for the assessed chemical, it is categorised as Persistent.

Bioaccumulation

Not Bioaccumulative (Not B). Based on the measured log Kow < 4.2, the assessed chemical is categorised as Not Bioaccumulative.

Toxicity

Not Toxic. Based on the available ecotoxicity values with all measured endpoints > 1 mg/L, the assessed chemical is categorised as Not Toxic.

Environmental risk characterisation

Although the assessed chemical is persistent, it does not meet all three PBT criteria. It is hence unlikely to have unpredictable long-term effects (EPHC 2009). An estimate of risk may therefore be determined using the risk quotient method.

Based on the PEC and PNEC values determined above, Risk Quotients (RQ = PEC ÷ PNEC) have been calculated for release of the assessed chemical to water:

Compartment	PEC	PNEC	RQ
River	0.05 µg/L	190 µg/L	< 0.01
Ocean	0.01 µg/L	190 µg/L	< 0.01

For the river and ocean compartments an RQ less than 1 indicates that introduction of the assessed chemical, in line with the defined scope of assessment, is not expected to pose a risk to the environment. As such, the risk from the assessed chemical can be managed, based on consideration of the environmental hazard characteristics and estimated releases.

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