Australian Government
Department of Health and Aged Care
Australian Industrial Chemicals Introduction Scheme

Alkyl diphenyl oxide sulfonates

Evaluation statement

26 June 2023

Table of contents

Contents

AICIS evaluation statement

Subject of the evaluation

Alkyl diphenyl oxide sulfonates

Chemicals in this evaluation

Name	CAS registry number
Benzenesulfonic acid, oxybis[dodecyl-	30260-73-2
Benzenesulfonic acid, decyl(sulfophenoxy)-, disodium salt	36445-71-3
Benzenesulfonic acid, hexadecyl(sulfophenoxy)-, disodium salt	65143-89-7
Benzenesulfonic acid, dodecyl(sulfophenoxy)-, diammonium salt	67968-24-5
Benzenesulfonic acid, oxybis[decyl-, disodium salt	70146-13-3
Benzenesulfonic acid, oxybis[hexadecyl-, disodium salt	70191-76-3

Reason for the evaluation

Evaluation Selection Analysis indicated a potential human health risk.

Parameters of evaluation

These chemicals are listed on the Australian Inventory of Industrial Chemicals (the Inventory). This evaluation is a human health risk assessment for all identified industrial uses of these chemicals.

These chemicals are a group of structurally similar long chain (C≥10) mono- and di-alkylated diphenyloxide sulfonates. These chemicals have been assessed as a group as they are dimers of alkylbenzene sulfonates with surfactant properties and are expected to have similar critical health effects primarily driven by the alkylbenzene sulfonate anion.

Summary of evaluation

Summary of introduction, use and end use

There is currently no specific information about the introduction, use and end use of this group of chemicals in Australia.

Based on international use information, the chemicals are surfactants that may be used in a variety of cosmetic, commercial, domestic, and site limited applications including as ingredients in personal care products, fragrances, and cleaning products.

Human health

Summary of health hazards

The critical health effects for risk characterisation include:

- local effects (eye irritation).

Chemicals in this group are expected to cause serious eye damage. In several guideline studies in rabbits, the chemical hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) induced effects on the cornea, iris, and/or conjunctivae that were not fully reversed within a 21day observation period.

Based on the available data, chemicals in this group are not expected to cause skin irritation. Whilst some skin irritation effects were observed in response to the chemical hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) in multiple studies, these effects were mild, resolved within 72 hours, and did not meet hazard classification criteria in the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) (UNECE 2017).

Based on the available data, chemicals in this group have low toxicity via oral and dermal routes.

Based on the weight of evidence and limited available data, chemicals in this group are not considered to be skin sensitisers.

There are no carcinogenicity data available for chemicals in this group. Based on the data available, these chemicals are not expected to be genotoxic nor cause reproductive and developmental toxicity.

The cation components, sodium and ammonium salts are not expected to contribute significantly to the toxicity of these chemicals.

Hazard classifications relevant for worker health and safety

These chemicals satisfy the criteria for classification according to the GHS (UNECE 2017) for hazard classes relevant for work health and safety as follows. This evaluation does not consider classification of physical hazards and environmental hazards.

Health hazards	Hazard category	Hazard statement
Serious damage to eyes/eye irritation	Eye damage 1	H318: Causes serious eye damage

Summary of health risk

Public

Based on the available use information, the public may be exposed to these chemicals:

- by direct application of these chemicals to the skin and/or hair

- by incidental skin and eye contact with these chemicals during use of domestic products
- by inhalation of aerosols for spray application products.

The critical health effect of chemicals in this group is the potential for serious damage to the eyes. The hazard profile and risks are similar to those of a large number of surfactants that are extensively used in products, with severity dependent on concentration and pH. The risks are minimised when products are formulated to be non-irritating. Additionally, chemicals in this group are likely to be frequently formulated with other surfactants with similar toxicity including alcohol ethoxylates, laureth sulfates and lauryl sulfates. Therefore, the risk may be impacted by the cumulative levels of surfactants. Any controls for these chemicals should be considered as part of a broader review of the management of surfactants in the *Poisons Standard — the Standard for the Uniform Scheduling of Medicines and Poison* (SUSMP).

Workers

During product formulation and packaging, dermal, ocular and inhalation exposure might occur, particularly where manual or open processes are used. These could include transfer and blending activities, quality control analysis, and cleaning and maintaining equipment. Worker exposure to these chemicals at lower concentrations could also occur while using formulated products containing these chemicals. The level and route of exposure will vary depending on the method of application and work practices employed.

Given the local health effects, these chemicals could pose a risk to workers. Control measures to minimise dermal, ocular and inhalation exposure are needed to manage the risk to workers (see **Proposed means for managing risks** section).

Proposed means for managing risk

Public health

No specific regulatory controls are recommended for the chemicals in this group as part of this evaluation. Any controls for these chemicals should be considered as part of a broader review of the management of surfactants in the SUSMP (TGA 2022).

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.

Information relating to safe introduction and use

The information in this statement including recommended hazard classifications, should be used by a person conducting a business or undertaking at a workplace (such as an employer) to determine the appropriate controls under the relevant jurisdiction Work Health and Safety laws.

Control measures that could be implemented to manage the risk arising from ocular, dermal and inhalation exposure to these chemicals include, but are not limited to:

- using closed systems or isolating operations
- minimising manual processes and work tasks through automating processes
- adopting work procedures that minimise splashes and spills
- cleaning equipment and work areas regularly
- using protective equipment that is designed, constructed, and operated to ensure that the worker does not come into contact with these chemicals.

Measures required to eliminate or manage risk arising from storing, handling and using these hazardous chemicals depend on the physical form and how these chemicals are used.

Personal protective equipment should not solely be relied upon to control risk and should only be used when all other reasonably practicable control measures do not eliminate or sufficiently minimise risk.

Model codes of practice, available from the SWA website, provide information on how to manage the risks of hazardous chemicals in the workplace, prepare an SDS and label containers of hazardous chemicals. Your Work Health and Safety regulator should be contacted for information on Work Health and Safety laws and relevant Codes of Practice in your jurisdiction.

Conclusions

The conclusions of this evaluation are based on the information described in this statement.

Considering the proposed means of managing risks, the Executive Director is satisfied that the identified human health risks can be managed within existing risk management frameworks. This is provided that all requirements are met under environmental, workplace health and safety and poisons legislation as adopted by the relevant state or territory and the proposed means of managing the risks identified during this evaluation are implemented.

Note: Obligations to report additional information about hazards under *Section 100* of the *Industrial Chemicals Act 2019* apply.

Supporting information

Grouping rationale

Chemicals in this group are structurally related long chain (C≥10) alkylated diphenyl-oxide sulfonates with surfactant properties. They are UVCB (unknown or variable composition, complex reaction products or of biological origin) chemicals, which consist of dimeric benzene sulfonates/sulfonic acids group with mono- or di-alkyl chain with various chain lengths attached at any position except for the sulfonated carbon. The chemicals have been assessed as a group as they are expected to have similar uses, toxicity and bioavailability.

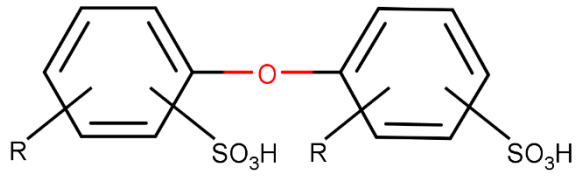
The chemicals are expected to exist almost entirely as the alkylated diphenyl-oxide sulfonate anion at the physiological pH and; therefore, are expected to have similar systemic toxicity. The cation components are not expected to contribute significantly to the toxicity of these chemicals.

Toxicology information of chemicals in this group is limited. The available data for hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) was used as read across for local and systemic effects, where data for other chemicals were unavailable.

Chemical identity

Chemical name	Benzenesulfonic acid, oxybis[dodecyl-
CAS No.	30260-73-2
Synonyms	oxybis(dodecylbenzenesulfonic acid)
Molecular formula	C36H58O7S2
Molecular weight (g/mol)	667.0
SMILES	CCCCCCCCCCCCC1=C(C=C(C=C1)S(=O)(=O)O)OC2=C(C=CC(=C2)S(=O)(=O)O)CCCCCCCCCCCC

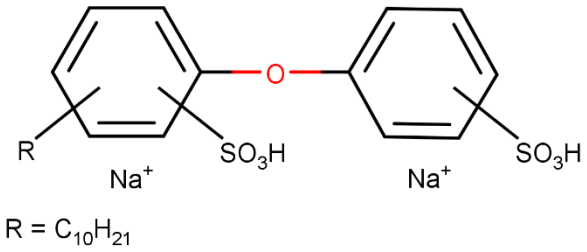
Structural formula:



R = $C_{12}H_{25}$

Chemical name	Benzenesulfonic acid, decyl(sulfophenoxy)-, disodium salt
CAS No.	36445-71-3
Synonyms	decyl(sulfophenoxy)benzenesulfonic acid, disodium salt disodium decyl diphenyl ether disulfonate disodium decyl(sulfophenoxy)benzenesulfonate disodium n-decyldiphenyl ether disulfonate
Molecular formula	C22H30O7S2.2Na
Molecular weight (g/mol)	516.6
SMILES	CCCCCCCCCCC1=C(C(=CC=C1)OC2=CC=CC=C2S(=O)(=O)O)S(=O)(=O)O.[Na+].[Na+]
Chemical description	Solid

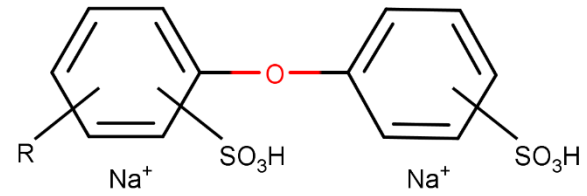
Structural formula:



Chemical name	Benzenesulfonic acid, hexadecyl(sulfophenoxy)-, disodium salt
CAS No.	65143-89-7
Synonyms	hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt
Molecular formula	C28H42O7S2.2Na
Molecular weight (g/mol)	600.7
SMILES	CCCCCCCCCCCCCCCCC1=C(C=CC=C1S(=O)(=O)O)OC2=CC=CC=C2S(=O)(=O)O.[Na+].[Na+]

Chemical description	Solid

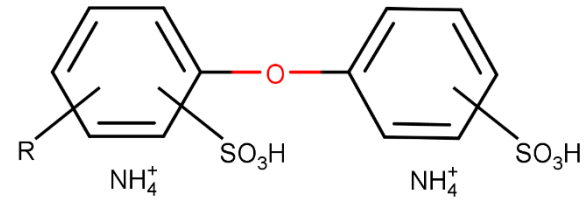
Structural formula:



R = $C_{16}H_{33}$

Chemical name	Benzenesulfonic acid, dodecyl(sulfophenoxy)-, diammonium salt
CAS No.	67968-24-5
Synonyms	ammonium monododecyldiphenyl ether disulfonate monododecyldiphenyl ether, disulfonic acid, diammonium salt
Molecular formula	C24H34O7S2.2H3N
Molecular weight (g/mol)	532.7
SMILES	CCCCCCCCCCCCC1=C(C(=CC=C1)S(=O)(=O)O)OC2=CC=CC=C2S(=O)(=O)O.[NH4+].[NH4+]

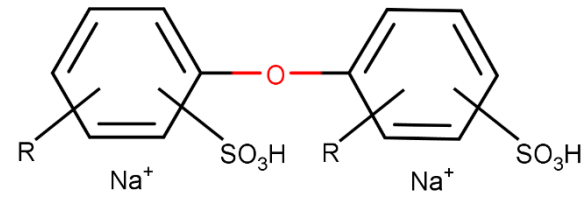
Structural formula:



R = $C_{12}H_{25}$

Chemical name	Benzenesulfonic acid, oxybis[decyl-, disodium salt
CAS No.	70146-13-3
Synonyms	disodium oxybis(decylbenzenesulphonate)

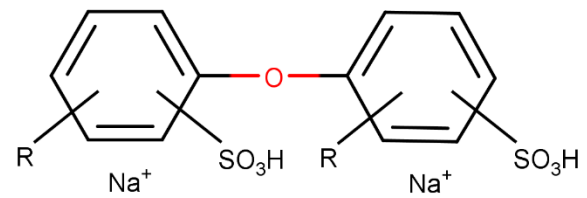
Molecular formula	C32H50O7S2.2Na
Molecular weight (g/mol)	656.8
SMILES	CCCCCCCCCCC1=C(C=CC=C1S(=O)(=O)O)OC2=C(C(=CC=C2)S(=O)(=O)O)CCCCCCCCCC.[Na+].[Na+]



R = $C_{10}H_{21}$

Structural formula:

Chemical name	Benzenesulfonic acid, oxybis[hexadecyl-, disodium salt
CAS No.	70191-76-3
Synonyms	disodium oxybis(hexadecylbenzenesulfonate) oxybis(hexadecylbenzenesulfonic acid), disodium salt
Molecular formula	C44H74O7S2.2Na
Molecular weight (g/mol)	825.2
SMILES	CCCCCCCCCCCCCCCCCC1=CC(=C(C=C1)OC2=C(C=C(C=C2)CCCCCCCCCCCCCCCCCC)S(=O)(=O)O)S(=O)(=O)O.[Na+].[Na+]



R = $C_{16}H_{33}$

Structural formula:

Relevant physical and chemical properties

These chemicals are solid at ambient temperatures, with melting points ranging from 291–350°C and boiling points ranging from 667–922°C [calculated with EPI MPBPVP (DTU n.d.)]. These chemicals are expected to have low volatility [≤2.42 × 10^{-19} mmHg; calculated with EPI MPBPVP (DTU n.d.)] and log Kow values ranging from 4.07–14.93 [EPI KOWWIN (DTU n.d.)] increasing with chain length.

Introduction and use

Australia

No specific Australian information on introduction, use and end use have been identified for the alkyl diphenyl oxide sulfonates subject to this evaluation.

International

No information was available on international use and end use of chemicals CAS Nos. 30260-73-2 and 67968-24-5.

The following international uses of chemicals CAS Nos. 36445-71-3, 65143-89-7, 70146-13-3, and 70191-76-3 have been identified through the following sources:

- Cleaning Product Ingredient Safety Initiative Database (ACI n.d.)
- Comptox Chemicals Dashboard (USEPA n.d.)
- Consumer Products Information Database (DeLima Associates n.d.)
- Substances in Preparation in Nordic Countries Database (SPIN n.d.).

Chemicals CAS Nos. 36445-71-3 and 65143-89-7 have reported use in personal care products and in fragrances.

Chemicals CAS Nos. 36445-71-3, 65143-89-7, and 70146-13-3 have reported use in domestic and commercial cleaning products and washing agents.

Chemicals CAS Nos. 36445-71-3, 65143-89-7, 70146-13-3, and 70191-76-3 have reported commercial uses as photochemicals and/or reprographic agents.

Chemicals CAS Nos. 36445-71-3 and 70146-13-3 have reported site-limited uses as solvents, as surface-active agents/treatments, and as chemical intermediates.

Chemical CAS Nos. 36445-71-3 also has reported site limited use in rubberising materials.

All chemicals, except CAS Nos. 67968-24-5, have reported non-industrial use in pesticides.

Existing Australian regulatory controls

AICIS

No specific controls are currently available for these chemicals.

Public

No specific controls are currently available for these chemicals.

Workers

These chemicals are not listed on the HCIS (SWA n.d.).

Health hazard information

Toxicokinetics

No toxicokinetic data are available for this group of chemicals.

Chemicals in this group are dimers of mono- and di-alkylated alkylbenzene sulfonates and are likely to have similar absorption to linear alkylbenzene sulfonates (LAS).

In general, LAS are readily absorbed through the gastrointestinal tract, are distributed throughout the body and are extensively metabolised. The parent compound and metabolites are excreted primarily in the urine and faeces. However, the main route of excretion is isomer dependent. The limited evidence available shows that dermal absorption of LAS is low, although prolonged contact may compromise the dermal barrier and allow increased absorption to occur (HERA 2013).

Acute toxicity

Oral

Based on the available data, these chemicals are expected to have low oral toxicity.

In a GLP compliant acute oral toxicity study conducted in accordance with OECD TG 401, Sprague Dawley (SD) rats (5/sex/dose) were treated with a single dose of 5000 mg/kg bw (body weight) of salt hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7). No mortality was observed in the 14 days of observation. The reported median lethal dose (LD50) was >5000 mg/kg bw. Reported sublethal signs of toxicity included hunched posture which was observed in one male (REACH n.d.).

In a GLP compliant acute oral toxicity study conducted in accordance with OECD TG 401, Wistar rats (5/sex/dose) were treated with a single dose of 5000 mg/kg bw of hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7). No mortality was observed in the following 14 days of observation and thus, the reported LD50 value was >5000 mg/kg bw. Reported sublethal signs of toxicity included diarrhoea, reduced defecation and blood around the nose (in one animal) (REACH n.d.).

In a non-guideline acute oral toxicity study, female Fischer 344 rats (3/dose) were treated with single doses of 1000, 1500 or 2000 mg/kg bw of hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7). In the following 14 days of observation, no mortality was observed in the 1000 mg/kg bw group, 1 death was observed in the 1500 mg/kg bw group, and 1 death was observed in the 2000 mg/kg bw group. The reported LD50 value was >2000 mg/kg bw. Reported sublethal signs of toxicity included diarrhoea, lethargy, palpebral closure and red facial soiling (REACH n.d.).

In a non-guideline acute oral toxicity study, male Fischer 344 rats (3/dose) were treated with a single dose of 2000 mg/kg bw of hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7). No mortality was observed in the following 14 days of observation and thus, the reported LD50 value was >2000 mg/kg bw. Reported sublethal signs of toxicity included faecal soiling and salivation (REACH n.d.).

In addition, the following oral LD50 values have been reported:

- 1420–3562 mg/kg bw in rats for decyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 36445-71-3). Reported clinical signs of toxicity included gastrointestinal hypermotility and diarrhoea (CCOHS 2002a)
- >900–1782 mg/kg bw in female rats for decyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 36445-71-3) (US EPA 2010)
- >2000 to >5000 mg/kg bw in rats for hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) (CCOHS 2002b; US EPA 2010)
- 3872 mg/kg bw in female SD rats for hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) (US EPA 2010).

Dermal

Based on the available data, these chemicals are expected to have low dermal toxicity and do not warrant hazard classification.

In a GLP compliant acute dermal toxicity study conducted in accordance with OECD TG 402, SD rats (5/sex) were treated with a single dose (2000 mg/kg bw) of hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) for 24 hours, in both sexes. No mortality was observed in the following 14 days of observation, and thus, the LD50 was >2000 mg/kg bw. No signs of sublethal toxicity, nor skin irritation, were reported (REACH n.d.).

In a GLP compliant acute dermal toxicity study conducted in accordance with OECD TG 402, Wistar rats (5/sex/dose) were treated with a single dose (2000 mg/kg bw) of hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) for 24 hours, in both sexes. No mortality was observed in the following 14 days of observation, and thus, the LD50 was >2000 mg/kg bw. Reported sublethal signs of toxicity included erythema and blood around the nose (REACH n.d.).

In addition, the following LD50 values have been reported:

- >1000 and >2000 mg/kg bw in rabbits for decyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 36445-71-3) (CCOHS 2002a; US EPA 2010)
- >1000 and >2000 mg/kg bw in rats for hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) (CCOHS 2002b; US EPA 2010).

Corrosion/Irritation

Skin irritation

Based on the weight of evidence of available data, these chemicals are not considered to be skin irritants.

In a GLP compliant skin irritation study conducted in accordance with OECD TG 404, New Zealand White (NZW) rabbits (3/sex) were treated with hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) (10% aqueous solution, reported as Dowfax 8390) for 4 hours under occluded conditions. Observations were recorded at 30 minutes, 24, 48, and 72 hours after patch removal. The mean erythema and oedema scores were 0 for all animals across all time points (maximum score 0 of 4). There were no reported signs of dermal irritation in any animal (REACH n.d.).

In a GLP compliant skin irritation study conducted in accordance with OECD TG 404, 3 NZW rabbits (sex not reported) were treated with hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) (0.5 g, 91.6% purity; reported as Dowfax 8390, 35% mono and dihexadecyl diphenyloxide mono- and disulfonate, sodium salts) for 4 hours under occluded conditions. Observations were recorded at 1, 24, 48, 72 hours after patch removal. The following mean scores were reported for observations at 1, 24, 48 and 72 hours: 1, 0.7, 0.3, 0 for erythema and 0.3, 0, 0, 0 for oedema respectively (maximum score 0 of 4). The erythema and oedema were reversible in all animals within 72 hours (REACH n.d.).

In a GLP compliant skin irritation study conducted in accordance with OECD TG 404, 3 female NZW rabbits were treated with hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) (reported as Dowfax XD 8390) for 4 hours under semi-occluded conditions. Observations were recorded at 40 minutes, 24, 48, 72 hours after patch removal. The following mean scores were reported for observations at 40 minutes, 24, 48 and 72 hours: 1, 0.7, 0.7, 0 for erythema and 0.7, 0, 0, 0 for oedema respectively (maximum score 0 of 4). The erythema and oedema were reversible in all animals within 72 hours (REACH n.d.).

Application of 0.5 g of hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) (dry and moistened with water) to shaved and abraded skin of two male NZW rabbits resulted in no irritation within 8 days (US EPA 2010). No further details were provided.

Application of decyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 36445-71-3) (unknown amount) to intact and abraded skin of two rabbits (strain not reported) did not induce irritation (USEPA 2010). No further study details were available.

Eye irritation

Limited data are available. Based on the available data for hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7), chemicals in this group are expected to cause serious eye damage.

In a GLP compliant eye irritation study conducted in accordance with OECD TG 405, hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) (0.1 mL, ~ 37%; reported as Dowfax XD 8390) was instilled into one eye each of 3 female NZW rabbits. Observations were recorded at 1, 24, 48, and 72 hours, and 7, 14, and 21 days. The following mean scores were reported at 24, 48, and 72 hours: corneal opacity 0/4,

iritis 0/2, conjunctival redness 2/3 and chemosis 1/4. The observed effects were not reversible in 1/3 animals within 21 days (REACH n.d.).

In a GLP compliant eye irritation study conducted in accordance with OECD TG 405, hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) (~50 mg, 91.6% purity; reported as Dowfax 8390) was instilled into one eye of a NZW rabbit (sex not reported). Observations were recorded at 1, 24, 48, and 72 hours, and 7 and 14 days. The following mean scores were reported at 24, 48, and 72 hours: corneal opacity 3/4, iritis 1/2, conjunctival redness 2/3, chemosis 3/4 and discharge 3/3. The observed effects were fully reversible within 14 days (REACH n.d.).

In a GLP compliant eye irritation study conducted in accordance with OECD TG 405, hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) (0.1 mL, ~1.8%; reported as 5% aqueous Dowfax 8390) was instilled into one eye each of NZW rabbits (3/sex). The eyes were left unwashed for 24 hours and observations were recorded at 1, 24, 48, and 72 hours, and 7 days. The following mean scores were reported at 24, 48, and 72 hours: corneal opacity 1/4, iritis 0/2, conjunctival redness 1/3, chemosis 1/4 and discharge 1/3. The observed effects were fully reversible within 7 days (REACH n.d.).

In a non-guideline study, 0.1 g (>90%) of hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) in powder form was applied to both eyes of a male NZW rabbit. The right and left eyes were washed after 30 seconds and 1 hour of exposure, respectively. Observations were recorded at 1, 24, 48, 72 hours, and 7, 14 and 21 days after instillation. The chemical was moderately irritating to the eye. The observed effects were not fully reversible after 21 days for the 1 hour exposure condition (REACH n.d.).

In a non-guideline study, undiluted 0.1 mL (37%) hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) was instilled into both eyes of a female NZW rabbit. The right and left eyes were washed after 30 seconds and 1 hour of exposure, respectively. The eyes were observed at 1, 24, 48, 72 hours, and 7, 14 and 21 days after instillation. The chemical was irritating to the eye and the effects were fully reversible after 21 days for both conditions (REACH n.d.).

In three eye irritation studies in NZW rabbits, decyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 36445-71-3) was reported to induce redness, chemosis, discharge, iritis, and corneal opacity (USEPA 2010). No further study details were available.

Sensitisation

Skin sensitisation

Based on the available data these chemicals are not considered to be skin sensitisers.

In a GLP compliant guinea pig maximisation test (GPMT) conducted according to OECD TG 406, intradermal induction was performed using 0.5% (w/v) of hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) in water and topical induction with 50% (w/v) of the chemical in water. The animals were challenged with 5 and 10% (w/v) in water. After challenge, reactions were reported in 12% of the animals. The chemical was reported to be non-sensitising in this study (REACH n.d.).

In a GLP compliant in vivo skin sensitisation study conducted in accordance with OECD TG 406 (Buehler test), dermal induction was performed using hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) at 75%

(w/w) in water. Challenge with the chemical at 75% (w/w) in water resulted in no skin reactions (REACH n.d.).

In a GLP compliant GPMT conducted according to OECD TG 406, intradermal induction was performed using 0.1% hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) (v/v), and topical induction with 5% (v/v) in water. Challenge with the chemical at 2% (v/v) in water resulted in no skin reactions (REACH n.d.).

In an in vivo skin sensitisation study described as being a modified Buehler test, dermal induction was performed using hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7) at 1% concentration in water for the first and second inductions and 0.5% for the third induction. Challenge with the chemical at 0.5% in water resulted in no skin reactions (REACH n.d.).

Repeat dose toxicity

Oral

Limited data are available. Based on the available data for hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7), chemicals in this group are not expected to cause serious systemic health effects following repeated oral exposure.

In a GLP compliant 28 day study similar to OECD TG 407, CD rats [reportedly of remote SD origin] (5/sex/dose) were administered the chemical (36.7%; reported as Dowfax XD 8390) by gavage at 0, 50, 250 or 1000 mg/kg bw/day for 28 consecutive days. Decreased rate of bodyweight gain in males and slight increases in liver and kidney weights were reported in females at 1000 mg/kg bw/day. Minor changes in blood chemistry and haematology in both sexes were also reported. Pathological findings included fatty vacuolation of the liver in two males and one female at 1000 mg/kg bw/day. The no observed adverse effect level (NOAEL) was determined to be 250 mg/kg bw/day (REACH n.d.).

In a GLP compliant combined repeated dose toxicity study with the reproduction/developmental toxicity screening test conducted in accordance with OECD TG 422, Fischer 344 rats (12/sex/dose) were administered the chemical (36.7% purity; reported as Dowfax 8390) by gavage once daily at 0, 25, 75, or 250 mg/kg bw/day for a total of 47 days (males) and up to 54 days (females). Statistically significant increases in prothrombin times were observed in males at 75 mg/kg bw/day. Increased mean serum alanine transaminase activity (ALT) levels were reported for both sexes and increased aspartate transaminase (AST) activity was reported for females at 250 mg/kg bw/day. No treatment related histopathological changes were observed. An NOAEL of 25 mg/kg bw/day was reported for both sexes (REACH n.d.).

In a non-guideline repeated dose toxicity study, SD rats (15/sex/dose) were administered the chemical (reported as Dowfax XC 8390) in feed at 0, 50, 100, 200 or 600 mg/kg bw/day for 90 days. No mortality and no treatment related clinical signs of toxicity were reported. The NOAEL values of 100 and 200 mg/kg bw/day were reported for females and males, respectively, based on increased absolute and relative kidney weights, and kidney swelling observed at higher doses (REACH n.d.).

In a non-guideline repeated dose toxicity study, Beagle dogs (4/sex/dose) were administered the chemical in diet at 0, 50, 100, or 200 mg/kg bw/day for 90 days. No mortality and no treatment related clinical signs of toxicity were reported. The NOAEL was determined to be

200 mg/kg bw/day in both sexes, based on the lack of adverse effects observed at the highest dose (REACH n.d.).

Genotoxicity

Based on the available data for hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7), chemicals in this group are not considered to have genotoxic potential.

In Vitro

Negative results were reported in the following in vitro genotoxicity studies at cytotoxic concentrations (REACH n.d.):

- a bacterial reverse mutation assay (OECD TG 471) in *Salmonella typhimurium* strains TA 98, TA 100, TA 1535, TA 1537 and TA 1538, with and without metabolic activation (S9) at concentrations up to 500 µg/plate
- a chromosome aberration assay (OECD TG 473) in rat lymphocytes with and without metabolic activation (S9) at concentrations up to 150 µg/mL
- a chromosome aberration assay (OECD TG473) in human lymphocytes with and without metabolic activation, at concentrations up to 1000 µg/mL (without metabolic activation) and 3300 µg/mL (with metabolic activation)
- a mammalian gene mutation assay (OECD TG 476) in the hypoxanthine-guanine phosphoribosyl transferase (HPRT) locus in Chinese hamster ovary (CHO) cells with and without metabolic activation at concentrations up to 40 µg/mL (without metabolic activation) and 200 µg/mL (with metabolic activation).

In Vivo

In a non-guideline mammalian bone marrow chromosomal aberration test, SD rats (5/sex/dose) were administered the chemical in feed at 0, 50, 100, 200 or 600 mg/kg bw/day for 90 days. The incidence of chromosome aberrations in bone marrow did not increase significantly in any of the treated groups, indicating a lack of clastogenicity (REACH n.d.).

Carcinogenicity

No data are available for these chemicals. Based on data for long chain alkyl benzene sulfonates (AICIS 2022), chemicals in this group are not expected to have carcinogenic potential.

Reproductive and development toxicity

Based on the available data for hexadecyl(sulfophenoxy)benzenesulfonic acid, disodium salt (CAS No. 65143-89-7), these chemicals are not expected to cause specific adverse effects on fertility/sexual function or development following oral exposure.

In a GLP compliant combined repeated dose toxicity study with the reproduction/developmental toxicity screening test conducted in accordance with OECD TG 422, CD rats (12/sex/dose) were administered the chemical by gavage once daily at 0, 25, 75, and 250 mg/kg bw/day from 14 days before mating for a total of 47 days (males) or up to 54 days (females). No toxicologically relevant effects on reproductive, gestational or developmental effects were observed. An NOAEL of 25 mg/kg bw/day was established for

maternal toxicity and 250 mg/kg bw/day for reproductive and developmental toxicity (REACH n.d.).

References

ACI (American Cleaning Institute) (n.d.) *Cleaning Product Ingredient Safety Initiative Database*, ACI website, accessed 15 January 2023.

AICIS (Australian Industrial Chemicals Introduction Scheme) (2022) *Long chain (C≥10) alkyl benzene sulfonates*, AICIS, accessed 15 February 2023.

CCOHS (Canadian Centre for Occupational Health and Safety) (2002a) *Record for CAS No. 36445-71-3*, CCOHS, accessed January 2023.

CCOHS (Canadian Centre for Occupational Health and Safety) (2002b) *Record for CAS No. 65143-89-7*, CCOHS, accessed January 2023.

DeLima Associates (n.d.) *Consumer Products Information Database*, DeLima Associates website, accessed 15 January 2023.

DTU (Danish Technical University) (n.d.) *Danish (Q)SAR Database*, DTU website, accessed 15 February 2023.

HERA (Human and Environment Risk Assessment on Ingredients of Household Cleaning Products) (2013) *LAS: Linear Alkylbenzene Sulphonate (CAS No. 68411-30-3)*, HERA, accessed 15 February 2023.

REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) (n.d.) *Registered dossier for CAS No. 65143-89-7*, European Chemicals Agency website, accessed 15 January 2023.

SPIN (Substances in Preparation in Nordic Countries) (n.d.) *SPIN Database*, SPIN website, accessed 15 February 2023.

SWA (Safe Work Australia) (n.d.) *Hazardous Chemical Information System*, SWA website, accessed 15 January 2023.

TGA (Therapeutic Goods Administration) (2022) *Standard for the Uniform Scheduling of Medicines and Poisons No.37 (Poisons Standard October 2022)*, TGA, accessed 15 January 2023.

UNECE (United Nations Economic Commission for Europe) (2017) *Globally Harmonized System of Classification and Labelling of Chemicals (GHS) 7th Revised Edition*, UNECE, accessed 15 January 2023.

US EPA (United States Environmental Protection Agency) (n.d.) *CompTox Chemicals Dashboard*, USEPA website, accessed 15 January 2023.

US EPA (United States Environmental Protection Agency) (2010) *Screening-Level Hazard Characterization: Alkyl Diphenyl Oxide Disulfonates Category*, USEPA, accessed 15 January 2023.