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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

FULL PUBLIC REPORT

Cascalone

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (Cwlth) (the Act) and Regulations. This legislation is an Act of the Commonwealth of Australia. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) is administered by the Department of Health and Ageing, and conducts the risk assessment for public health and occupational health and safety. The assessment of environmental risk is conducted by the Department of Sustainability, Environment, Water, Population and Communities.

For the purposes of subsection 78(1) of the Act, this Full Public Report may be inspected at our NICNAS office by appointment only at Level 7, 260 Elizabeth Street, Surry Hills NSW 2010.

This Full Public Report is also available for viewing and downloading from the NICNAS website or available on request, free of charge, by contacting NICNAS. For requests and enquiries please contact the NICNAS Administration Coordinator at:

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Director
NICNAS

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APPLICANT(S)
Firmenich Limited (ABN: 86 002 964 794)
73 Kenneth Road
Balgowlah, NSW 2093

NOTIFICATION CATEGORY
Limited-small volume: Chemical other than polymer (1 tonne or less per year).

EXEMPT INFORMATION (SECTION 75 OF THE ACT)
Data items and details claimed exempt from publication: chemical name, other names, CAS number, molecular and structural formulae, molecular weight, analytical data, degree of purity, impurities and additives/adjuvants.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
No variation to the schedule of data requirements is claimed.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None

NOTIFICATION IN OTHER COUNTRIES
USA (2009)

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
Cascalone

MOLECULAR WEIGHT
<500 Da

ANALYTICAL DATA
Reference NMR, IR, MS, GC, and UV spectra were provided.

3. COMPOSITION

DEGREE OF PURITY >90%

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20°C AND 101.3 kPa: Yellow pasty solid

Property	Value	Data Source/Justification
Melting Point/Freezing Point	34.8 ± 2 °C at 96.9 kPa	Measured
Boiling Point	267 ± 2 °C at 95.4 kPa	Measured
Density	1119 kg/m^3 at 40 °C	Measured
Vapour Pressure	1.8 x 10^{-4} kPa at 25 °C	Measured
Water Solubility	2.56 g/L at 20 °C	Measured
Hydrolysis as a Function of pH	Not determined	The notified chemical does not contain any readily hydrolysable functionality and is therefore expected to be hydrolytically stable
Partition Coefficient (n-octanol/water)	log K_{OW} = 2.46 at 30 °C	Measured
Surface Tension	45.0 mN/m at 21.6 °C	Measured

Adsorption/Desorption	log K_{OC} = 1.91 at 30 °C	Measured
Dissociation Constant	Not determined	The notified chemical does not contain dissociable functionality
Flash Point	142 ± 2 ºC at 101.3 kPa	Measured
Autoignition Temperature	400 ± 5 ºC	Measured
Explosive Properties	Predicted negative	Contains no functional groups that would imply explosive properties.
Oxidising Properties	Predicted negative	Contains no functional groups that would imply oxidising properties.

DISCUSSION OF PROPERTIES
For full details of tests on physical and chemical properties, refer to Appendix A.

Reactivity
The notified chemical is expected to be stable under normal conditions of use.

Dangerous Goods classification
Based on the submitted physical-chemical data in the above table the notified chemical is not classified according to the Australian Dangerous Goods Code (NTC, 2007). However, the data above do not address all Dangerous Goods endpoints. Therefore, consideration of all endpoints should be undertaken before a final decision on the Dangerous Goods classification is made by the introducer of the chemical.

5. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS
The notified chemical will be imported into Australia as a component (≤10%) of compounded fragrances.

MAXIMUM INTRODUCTION VOLUME OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	≤1	≤1	≤1	≤1	≤1

PORT OF ENTRY
Sydney, by wharf or airport

IDENTITY OF MANUFACTURER/RECIPIENTS
Firmenich Ltd

TRANSPORTATION AND PACKAGING
The fragrance preparations containing the notified chemical (at ≤10% concentration) will be imported in tightly closed lacquered drums, typically of 180 kg size, but also 100, 50, 25 10 or 5 kg. They will be transported by road from the wharf or airport of entry to the Firmenich Ltd warehouse for storage and then distributed to reformulation sites. The end-use products will be packaged in containers suitable for retail sale.

USE
The notified chemical will be used as a fragrance ingredient in a variety of cosmetic and domestic products. The notified chemical will be present at <1% concentration in fine perfumes and ≤0.025% in other cosmetic and domestic products.

OPERATION DESCRIPTION
The procedures for incorporating the imported products (containing up to 10% notified chemical) into end-use products will likely vary depending on the nature of the cosmetic and personal care/domestic products formulated, and may involve both automated and manual transfer steps. However, in general, it is expected that the reformulation processes will involve blending operations that will be highly automated and occur in a fully enclosed environment, followed by automated filling of the reformulated products (containing <1% notified chemical) into containers of various sizes.

The finished products containing the notified chemical (<1%) may be used by consumers and professionals such as hairdressers or workers in beauty salons. Depending on the nature of the product, these could be applied in a number of ways such as by hand, using an applicator or sprayed.

6. HUMAN HEALTH IMPLICATIONS

6.1 Exposure assessment

6.1.1 Occupational exposure

NUMBER AND CATEGORY OF WORKERS

Category of Worker	*Number*	*Exposure Duration (hours/day)*	*Exposure Frequency (days/year)*
Transport workers	4	Unknown	Unknown
Mixer	5	4	2
Drum Handling	5	4	2
Drum Cleaning	8	4	2
Maintenance	5	4	2
Quality Control	1	0.5	1
Packaging	10	4	2
Salon Workers	Unspecified	Unspecified	Unspecified

EXPOSURE DETAILS
Transport and storage workers may come into contact with the notified chemical, as a component of the imported products (≤10%) or end-use products (<1%), only in the event of accidental rupture of containers.

During formulation, exposure to the notified chemical (≤10%) may occur during weighing and transfer stages, blending, quality control analysis and cleaning and maintenance of equipment. Exposure is expected to be minimised through the use of mechanical ventilation and/or enclosed systems and through the use of personal protective equipment such as overalls, safety glasses and impervious gloves.

Exposure to the notified chemical in end-use products may occur in professions where the services provided involve the application of cosmetic and personal care products to clients (e.g. hair dressers, workers in beauty salons). Such professionals may use some personal protective equipment to minimise repeated exposure, and good hygiene practices are expected to be in place. If PPE is used, exposure of such workers is expected to be of a similar or lesser extent than that experienced by consumers using products containing the notified chemical.

6.1.2. Public exposure
There will be widespread and repeated exposure of the public to the notified chemical through the use of the rinse-off and leave-on cosmetic and personal care products. The principal route of exposure will be dermal, while ocular and inhalation exposure is also possible, particularly if products are applied by spray.

Data on typical use patterns of product categories in which the notified chemical may be used are shown in the following table (SCCP, 2006; Cadby *et al.*, 2002). For the purposes of the exposure assessment, Australian use patterns for the various product categories are assumed to be similar to those in Europe. In the absence of dermal absorption data, the default dermal absorption of 100% was assumed for calculation purposes (European Commission, 2003). Although, the actual level of dermal absorption may be lower than 100%, it may vary with the formulation type. Considering that there may be penetration enhancers in some cosmetic formulations, 100% was used in the estimation of the systemic dose. An adult bodyweight of 60 kg has been used for calculation purposes.

Product type	mg/event	events/day	**C** (%)	**RF**	**Daily exposure** (mg/day)	**Daily systemic exposure** (mg/kg bw/day)
Body lotion	7820	1	0.025	1	1.96	0.0326
Face cream	1540	1	0.025	1	0.385	0.0064
Fine fragrances	750	1	<1 (1 for calculation)	1	7.5	0.125
Fragranced cream	800	0.29	0.025	1	0.058	0.00097
Antiperspirant/ Deodorant						
i) stick	1510	1	0.025	1	0.3775	0.0063
ii) spray	6540	1	0.025	1	1.635	0.0272
Shampoo	10460	1	0.025	0.01	0.026	0.00044
Bath products	17000	0.29	0.025	0.001	0.0012	0.000021
Shower gel	5000	2	0.025	0.01	0.025	0.00042
Toilet soap	800	6	0.025	0.01	0.012	0.0002
Hair styling products	5000	2	0.025	0.1	0.25	0.0042
Total						0.204

C = concentration; RF = retention factor based on 100% dermal absorption.
Daily exposure = mg/event x events/day x C(%) x RF; Daily systemic exposure = daily exposure x dermal absorption (%) /body weight (60 kg)

The worst case scenario estimation using these assumptions is for a person who is a simultaneous user of all products listed in the above table that contain the notified chemical. This would result in a combined internal dose of 0.204 mg/kg bw/day.

6.2. Human health effects assessment

The results from toxicological investigations conducted on the notified chemical are summarised in the table below. Details of these studies can be found in Appendix B.

Endpoint	*Result and Assessment Conclusion*
Rat, acute oral toxicity	LD50 between 300-2000 mg/kg bw; harmful
Rat, acute dermal toxicity	LD50 >2000 mg/kg bw; low toxicity
Rabbit, skin irritation	irritating
Rabbit, eye irritation	slightly irritating with adverse effects
Mouse, skin sensitisation – Local lymph node assay	evidence of sensitisation
Rat, repeat dose oral toxicity – 28 days.	NOAEL = 300 mg/kg bw/day
Mutagenicity – bacterial reverse mutation	non mutagenic
Genotoxicity – in vitro mammalian chromosome aberration test.	non genotoxic

Toxicokinetics, metabolism and distribution.
Based on the molecular weight (<500 Da), water solubility (2.56 g/L) and partition co-efficient (log Pow 2.46 at 30 °C) of the notified chemical, it is expected that some passive diffusion across the gastrointestinal (GI) tract and dermal absorption will occur. The notified chemical is a pasty solid with low vapour pressure, therefore absorption via the respiratory tract is not anticipated.

Acute toxicity.
The notified chemical was found to be harmful in an acute oral toxicity study in rats. The single animal treated at a dose level of 2000 mg/kg was killed *in extremis ca.* 2 hours after dosing, after exhibiting signs of systemic toxicity (including hunched posture, ataxia, lethargy, pilo-erection, decreased respiratory rate, laboured respiration and hypothermia). No mortalities or signs of toxicity were noted in the animals treated at 300 mg/kg bw. Therefore, the discriminating dose could not be determined. However, the oral LD50 was considered by the study authors to be between 300 and 2000 mg/kg bw.

The notified chemical was found to be of low acute dermal toxicity in rats (LD50 >2000 mg/kg bw). No acute inhalation toxicity data are provided for the notified chemical.

Irritation and Sensitisation.
The notified chemical was determined to be irritating to the skin of rabbits, with very slight to well-defined erythema and very slight oedema noted. In an eye irritation study in rabbits, mild to moderate conjunctival irritation was noted. However, the scores did not warrant classification of the chemical as an eye irritant. All treated eyes appeared normal after 72 hours.

The notified chemical was found to be a sensitiser in a local lymph node assay in mice. At 10, 25 and 50% concentrations of the test substance, the reported stimulation indices were 1.64, 4.34 and 9.91 respectively, with no signs of systemic toxicity or skin irritation noted. Based on these results, the EC_3 is calculated to be 17.6%. In the preliminary screening test, the animal treated with 100% concentration test substance was humanely killed following the observations of signs of systemic toxicity, including hunched posture, lethargy and splayed gait.

Repeated Dose Toxicity.
There were no mortalities in a 28-day repeat dose oral toxicity study in rats. Treatment-related effects were, in general, limited to the high and mid dose groups, though for those effects observed in the mid dose group, they were deemed by the study authors to not be adverse. Treatment related effects included clinical observations (hunched posture, tiptoe/splayed gait, lethargy, ataxia, prostration, decreased respiratory rate, staining around the mouth, increase salivation and generalised fur loss), increased alanine aminotransferase and alkaline phosphatase levels, increased liver weight and centrilobular hepatocyte enlargement. A NOAEL of 300 mg/kg bw/day was established by the study authors, based on adverse effects (increased liver weights with centrilobular hepatocyte enlargement) seen at 600 mg/kg bw/day. However, statistically significant adrenal weights were observed in females at 30 and 300 mg/kg bw/day, but without a dose-response relationship. Thymus weights were also increased in females at 30 and 300 mg/kg bw/day.

Mutagenicity.
The notified chemical was not mutagenic in a bacterial reverse mutation study and was not clastogenic in an in vitro mammalian chromosome aberration test.

Health hazard classification
Based on the data provided, the notified chemical is classified as hazardous according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004) with the following risk phrases:

R22 Harmful if swallowed
R38 Irritating to skin
R43 May cause sensitisation by skin contact

6.3. Human health risk characterisation

6.3.1. Occupational health and safety
Reformulation
The notified chemical will be handled by workers at ≤10% concentration as imported, and at <1% in end-use products. While the notified chemical is considered to be harmful to human health via the oral route and a skin irritant, ingestion is unlikely under the occupational settings described and the notified chemical will be present in products at concentrations below the cut-offs for these effects (NOHSC, 2004). The notified chemical is considered to be a skin sensitiser and products containing it at concentrations ≥1% are classified as such, therefore caution should be exercised when handling the notified chemical at concentrations ≥1%.

Therefore, provided that control measures are in place to minimise worker exposure, including the use of automated processes and PPE, the risk to the health of workers from use of the notified chemical is not considered to be unacceptable.

End-Use
Beauty care professionals will handle the notified chemical at <1% concentration in fine fragrances and ≤0.025% in other cosmetic and domestic products, similar to public use. Therefore, the risk for beauty care professionals who regularly use products containing the notified chemical is expected to be of a similar or lesser extent than that experienced by members of the public who use such products on a regular basis.

Based on the information available, the risk to workers associated with use of the notified chemical at <1% concentration in cosmetic products is not considered to be unacceptable.

6.3.2. Public health

As stated above, the main risk associated with use of the notified chemical at <1% concentration in fine fragrances and ≤0.025% concentration in other cosmetic products, is its potential to cause sensitisation by skin contact. However, the risk of such effects at the intended usage concentrations is not considered to be unacceptable.

Repeat dose toxicity potential was estimated by calculation of the margin of exposure (MoE) of the notified chemical using the worst case exposure scenario of 0.204 mg/kg bw/day (see Section 6.1.2). A MoE value greater than or equal to 100 is considered acceptable to account for intra- and inter-species differences. Even with use of the low-dose concentration level (30 mg/kg bw/day) in the repeat dose toxicity study in the calculation of the MoE, a value of >100 (147) is estimated.

When used in the proposed manner, the risk to the public associated with the use of the notified chemical at <1% concentration in fine fragrances and ≤0.025% in other cosmetic and domestic products is not considered to be unacceptable.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Environmental Exposure & Fate Assessment

7.1.1 Environmental Exposure

RELEASE OF CHEMICAL AT SITE

The notified chemical will be imported as a component of fragrance preparations for local reformulation into a variety of consumer products (cosmetics, household products, fine fragrances). Losses during the blending processes at various sites throughout Australia are expected to be limited to traces of spills, formulation equipment cleaning and residues in empty packaging. Less than 0.1% of the total annual import volume of notified chemical is expected to remain as residues in import containers. The empty containers will eventually be recycled or disposed of to landfill. At the end of the reformulation run, the formulating equipment and packing equipment are washed and it is anticipated that the washings will be included in the next batch.

Accidental spills during transport or reformulation are expected to be collected with inert material and disposed of to landfill.

RELEASE OF CHEMICAL FROM USE

Most of the notified chemical will be incorporated as a fragrance additive into a variety of consumer products for dispersed use throughout Australia. Whilst there will be some releases of this moderately volatile fragrance chemical to the atmosphere, the majority of the imported quantity of notified chemical is expected to be released to sewer in domestic situations.

RELEASE OF CHEMICAL FROM DISPOSAL

Expired wastes and residue of the notified chemical in empty containers (<1%) are likely either to share the fate of the container and be disposed of to landfill, or to be washed to the sewer when containers are rinsed before recycling.

7.1.2 Environmental fate

The notified chemical is a moderately volatile compound and a fraction of the imported quantity of this chemical will partition to air, which is a functional requirement for fragrant products. The half-life of the notified chemical in air was calculated to be 2.34 h, based on reactions with hydroxyl radicals over a 12 hour day, and reaction with ozone is not expected (AOPWIN, v1.92; EPISuite, US EPA, 2009). The notified chemical is therefore not expected to persist in the air compartment.

The major proportion of the imported quantity of notified chemical will enter the sewer system as a result of the use of this chemical as an odorant in domestic consumer products such as cosmetics and household products. The notified chemical is not readily biodegradable and, based on its low adsorption coefficient (log K_{OC} = 1.91), only limited partitioning to sludge is expected. Most of the notified chemical is expected to remain in the water phase, due to its high water solubility, and may be released from sewage treatment plants to receiving waters, where it will disperse and eventually degrade. It has low potential to bioaccumulate, based on its low

octanol/water partition coefficient (log K_{OW} = 2.46) and its low bioconcentration factor (log BCF = 1.87) predicted by a regression-based method based on the measured partition coefficient (BCFBAF v3.00; US EPA, 2009). A small proportion of notified chemical may be applied to land when effluent is used for irrigation, and residues in empty containers are expected to be disposed of to landfill. Notified chemical in landfill, soil and sludge are likely to be mobile, and is expected to degrade biotically or abiotically to form water and oxides of carbon.

For the details of the environmental fate studies, refer to Appendix C.

7.1.3 Predicted Environmental Concentration (PEC)

A Predicted Environmental Concentration (PEC) has been calculated assuming a worst case in which 100% of the annual imported quantity of notified chemical will be released to sewer nationwide and that no removal of the notified chemical will occur at sewage treatment plants.

Predicted Environmental Concentration (PEC) for the Aquatic Compartment		
Total Annual Import/Manufactured Volume	1,000	kg/year
Proportion expected to be released to sewer	100%	
Annual quantity of chemical released to sewer	1,000	kg/year
Days per year where release occurs	365	days/year
Daily chemical release:	2.74	kg/day
Water use	200.0	L/person/day
Population of Australia (Millions)	21.161	million
Removal within STP	0%	
Daily effluent production:	4,232	ML
Dilution Factor - River	1.0	
Dilution Factor - Ocean	10.0	
PEC - River:	0.65	µg/L
PEC - Ocean:	0.06	µg/L

STP effluent re-use for irrigation occurs throughout Australia. The agricultural irrigation application rate is assumed to be 1000 L/m^2/year (10 ML/ha/year). The notified chemical in this volume is assumed to infiltrate and accumulate in the top 10 cm of soil (density 1500 kg/m^3). Using these assumptions, irrigation with a concentration of 0.647 µg/L may potentially result in a soil concentration of approximately 4.316 µg/kg. Assuming accumulation of the notified chemical in soil for 5 and 10 years under repeated irrigation, the concentration of notified chemical in the applied soil in 5 and 10 years may be approximately 21.58 µg/kg and 43.16 µg/kg, respectively.

7.2. Environmental effects assessment

The results from ecotoxicological investigations conducted on the notified chemical are summarised in the table below. Details of these studies can be found in Appendix C.

Endpoint	*Result*	*Assessment Conclusion*
Daphnia Toxicity	48 h EC50 >100 mg/L	Not harmful to aquatic invertebrates
Algal Toxicity	96 h E_rC50 = 87 mg/L	Harmful to algae
Inhibition of Bacterial Respiration	3 h IC50 = 390 mg/L	Not inhibitory to bacterial respiration

Under the Globally Harmonised System for the Classification and Labelling of Chemicals (GHS) (United Nations, 2009), the notified chemical is not considered to be harmful to aquatic invertebrates, but is considered harmful to algae. Based on its acute toxicity to aquatic biota, the notified chemical is formally classified under the GHS as 'Acute Category 3; Harmful to aquatic life'. On the basis of its algal toxicity and lack of ready biodegradability, the notified chemical is formally classified as 'Chronic Category 3; Harmful to aquatic life with long lasting effects'.

7.2.1 Predicted No-Effect Concentration

The Predicted No-Effect Concentration (PNEC) was calculated using the acute endpoint for the most sensitive species (algae) and an assessment factor of 1000, as endpoints for only two trophic levels are available.

Predicted No-Effect Concentration (PNEC) for the Aquatic Compartment		
E_rC50 (Algae)	87	mg/L
Assessment Factor	1,000	
PNEC:	87	µg/L

7.3. Environmental risk assessment

Based on the above PEC and PNEC values, the following Risk Quotient (Q) has been calculated:

Risk Assessment	*PEC µg/L*	*PNEC µg/L*	*Q*
Q - River:	0.65	87	0.007
Q - Ocean:	0.06	87	0.001

The risk quotient (PEC/PNEC) for the conservative worst case scenario of unmitigated release of the notified chemical to surface waters in treated effluents is well below 1 for both riverine and oceanic discharge scenarios. Therefore, at the maximum importation volume, the notified chemical is not expected to pose a risk to the environment when used as described.

8. CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification

Based on the data provided, the notified chemical is classified as hazardous according to the *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(2004)] with the following risk phrases:

R22 Harmful if swallowed
R38 Irritating to skin
R43 May cause sensitisation by skin contact

and

The classification of the notified chemical using the Globally Harmonised System for the Classification and Labelling of Chemicals (GHS) (United Nations, 2009) is presented below. This system is not mandated in Australia and carries no legal status but is presented for information purposes.

	Hazard category	*Hazard statement*
Irritation	3	Warning: Causes mild skin irritation
Acute toxicity	4	Warning: Harmful if swallowed
Sensitization	1B	Warning: May cause an allergic skin reaction
Aquatic Environment	Acute Category 3	Harmful to aquatic life
	Chronic Category 3	Harmful to aquatic life with long lasting effects

Human health risk assessment

Under the conditions of the occupational settings described, the notified chemical is not considered to pose an unacceptable risk to the health of workers.

When used in the proposed manner, the notified chemical is not considered to pose an unacceptable risk to public health.

Environmental risk assessment

On the basis of the PEC/PNEC ratio and the reported use pattern, the notified chemical is not considered to pose an unacceptable risk to the environment.

Recommendations

REGULATORY CONTROLS
Hazard Classification and Labelling

- Safe Work Australia, should consider the following health hazard classification for the notified chemical:
  - Xn: R22 Harmful if swallowed
  - Xi: R38 Irritating to skin
  - Xi: R43 May cause sensitisation by skin contact

- Use the following risk phrases for products/mixtures containing the notified chemical:
  - Conc. ≥25%: Xn; R22; R38; R43;
  - ≥20% Conc. <25%: Xi; R38; R43;
  - ≥1% Conc. <20%: Xi; R43.

Health Surveillance

- As the notified chemical is a skin sensitiser, employers should carry out health surveillance for any worker who has been identified in the workplace risk assessment as having a significant risk of sensitisation.

CONTROL MEASURES
Occupational Health and Safety

- Employers should implement the following engineering controls to minimise occupational exposure to the notified chemical as introduced (≤10%):
  - Automated processes, where possible

- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified chemical as introduced (≤10%):
  - Avoid contact with skin

- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified chemical as introduced (≤10%):
  - Coveralls
  - Gloves

  Guidance in selection of personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

- A copy of the MSDS should be easily accessible to employees.

- If products and mixtures containing the notified chemical are classified as hazardous to health in accordance with the *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(2004)] workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

Disposal

- The notified chemical should be disposed of to landfill.

Emergency procedures

- Spills or accidental release of the notified chemical should be handled by physical containment, collection and subsequent safe disposal.

Regulatory Obligations

Secondary Notification
This risk assessment is based on the information available at the time of notification. The Director may call for the reassessment of the chemical under secondary notification provisions based on changes in certain circumstances. Under Section 64 of the *Industrial Chemicals (Notification and Assessment) Act (1989)* the notifier, as well as any other importer or manufacturer of the notified chemical, have post-assessment regulatory obligations to notify NICNAS when any of these circumstances change. These obligations apply even when the notified chemical is listed on the Australian Inventory of Chemical Substances (AICS).

Therefore, the Director of NICNAS must be notified in writing within 28 days by the notifier, other importer or manufacturer:

(1) Under Section 64(1) of the Act; if
- the importation volume exceeds one tonne per annum notified chemical;

or

(2) Under Section 64(2) of the Act; if
- the function or use of the chemical has changed from a component of fine fragrances at <1% or other cosmetic and domestic products at ≤0.025% or is likely to change significantly;
- the chemical has begun to be manufactured in Australia;
- additional information has become available to the person as to an adverse effect of the chemical on occupational health and safety, public health, or the environment.

The Director will then decide whether a reassessment (i.e. a secondary notification and assessment) is required.

Material Safety Data Sheet
The MSDS of products containing the notified chemical provided by the notifier were reviewed by NICNAS. The accuracy of the information on the MSDS remains the responsibility of the applicant.

APPENDIX A: PHYSICAL AND CHEMICAL PROPERTIES

Melting Point/Freezing Point 34.8 ± 2 ºC at 96.9 kPa

Method	OECD TG 102 Melting Point/Melting Range.
Remarks	Determined using the capillary method (metal block)
Test Facility	Firmenich (2009)

Boiling Point 267 ± 2 ºC at 95.4 kPa

Method	OECD TG 103 Boiling Point.
Remarks	Determined using the method according to Siwoloboff
Test Facility	Firmenich (2009)

Density 1119 kg/m^3 at 40 ºC

Method	OECD TG 109 Density of Liquids and Solids.
Remarks	Determined using the oscillating densitometer method
Test Facility	Firmenich (2009)

Vapour Pressure 1.8 x 10^{-4} kPa at 25 ºC

Method	OECD TG 104 Vapour Pressure. EC Directive 92/69/EEC A.4 Vapour Pressure.
Remarks	Determined using the gas saturation method
Test Facility	Harlan (2009a)

Water Solubility 2.56 g/L at 20 ºC

Method	OECD TG 105 Water Solubility. EC Directive 92/69/EEC A.6 Water Solubility.
Remarks	Flask Method. In triplicate, test material (~1.3 g) was added to double distilled water (250 mL) and shaken at approximately 30 °C for 8 hours. After standing for 24 h at 20 °C, the test samples were filtered and measured for pH. The concentrations of the test substance in the sample solutions were determined by HPLC (UV).
Test Facility	Firmenich (2009)

Partition Coefficient (n-octanol/water) log K_{OW} = 2.46 at 30 ºC

Method	OECD TG 117 Partition Coefficient (n-octanol/water). EC Directive 92/69/EEC A.8 Partition Coefficient.
Remarks	HPLC Method. The partition coefficient was determined by interpolation from a calibration curve constructed from six known standards (log K_{OW} range 2.1 to 4.0) in accordance with the guidelines above. The notified chemical eluted with tailing. Due to the surface activity of the notified chemical and the observed peak tailing, these results should be treated with caution.
Test Facility	Firmenich (2009)

Surface Tension 45.0 mN/m at 21.6 ºC

Method	OECD TG 115 Surface Tension of Aqueous Solutions. EC Directive 92/69/EEC A.5 Surface Tension.
Remarks	Concentration: 1.01 g/L The test material is considered to be a surface active material.
Test Facility	Harlan (2009b)

Adsorption/Desorption – screening test log K_{OC} = 1.91 at 30 °C

Method	OECD TG 121 Estimation of the Adsorption Coefficient (K_{oc}) on Soil and on Sewage Sludge using High Performance Liquid Chromatography (HPLC).
Remarks	HPLC Method. The adsorption coefficient was determined by interpolation from a calibration curve constructed from known standards (log K_{oc} range 1.25 to 5.63) in accordance with the guidelines above. Although the notified chemical has surface active characteristics, the HPLC conditions appear to be appropriate for this structure as minimal peak broadening was observed.
Test Facility	Harlan (2009c)

Flash Point 142 ± 2 °C at 101.3 kPa

Method	EC Directive 92/69/EEC A.9 Flash Point.
Remarks	Determined using a closed cup equilibrium method
Test Facility	Firmenich (2009)

Autoignition Temperature 400 ± 5 °C

Method	EC Directive 92/69/EEC A.15 Auto-Ignition Temperature (Liquids and Gases).
Remarks	Determined by heating aliquots of the test material in a flask and observing any ignition
Test Facility	Harlan (2009d)

Explosive Properties

Method	EC Directive 92/69/EEC A.14 Explosive Properties.
Remarks	The structure was assessed for functional groups that would infer explosive properties. Predicted negative.
Test Facility	Harlan (2009d)

Oxidizing Properties

Method	EC Directive 2004/73/EC A.21 Oxidizing Properties (Liquids).
Remarks	The structure was assessed for functional groups that would infer oxidising properties. Predicted negative.
Test Facility	Harlan (2009d)

APPENDIX B: TOXICOLOGICAL INVESTIGATIONS

B.1. Acute toxicity – oral

TEST SUBSTANCE: Notified chemical

METHOD: OECD TG 420 Acute Oral Toxicity - Fixed Dose Method.
- Species/Strain: Rat/Wistar
- Vehicle: Arachis oil BP
- Remarks - Method: No significant protocol deviations

RESULTS

Group	*Number and Sex of Animals*	*Dose mg/kg bw*	*Mortality*
I	1F	2000	1/1
II	5F	300	0/5

- Signs of Toxicity: The animal treated at a dose level of 2000 mg/kg was killed *in extremis ca.* 2 hours after dosing. Signs of toxicity included hunched posture, ataxia, lethargy, pilo-erection, decreased respiratory rate, laboured respiration and hypothermia. No signs of systemic toxicity were noted for animals treated at 300 mg/kg bw.
- Effects in Organs: None
- Remarks - Results: Surviving animals showed expected gains in bodyweight.
  The discriminating dose could not be determined. However, the LD50 was determined by the study authors to be between 300 and 2000 mg/kg bw.

CONCLUSION: The notified chemical is harmful via the oral route.

TEST FACILITY: Harlan (2009e)

B.2. Acute toxicity – dermal

TEST SUBSTANCE: Notified chemical

METHOD: OECD TG 402 Acute Dermal Toxicity – Limit Test.
- Species/Strain: Rat/Wistar
- Vehicle: None
- Type of dressing: Semi-occlusive.
- Remarks - Method: No significant protocol deviations.
  The test substance was melted in a warming bath set at 60 ºC and allowed to cool prior to dosing.

RESULTS

Group	*Number and Sex of Animals*	*Dose mg/kg bw*	*Mortality*
I	5M/5F	2000	0/10

- Remarks - Results: Two females showed no bodyweight gain and one female showed bodyweight loss during the first week followed by weight gain during the second week.
- LD50: >2,000 mg/kg bw
- Signs of Toxicity: None
- Effects in Organs: None

CONCLUSION: The notified chemical is of low toxicity via the dermal route.

TEST FACILITY Harlan (2009f)

B.3. Irritation – skin

TEST SUBSTANCE Notified chemical

METHOD OECD TG 404 Acute Dermal Irritation/Corrosion.
Species/Strain Rabbit/New Zealand White
Number of Animals 3
Vehicle Distilled water
Observation Period 14 Days
Type of Dressing Semi-occlusive.
Remarks - Method One rabbit was initially treated at 3 test sites with exposure periods of 3 minutes, 1 hour and 4 hours. Two additional animals were then treated with a single application (4-hour exposure).

RESULTS

Lesion	*Mean Score* Animal No.*			*Maximum Value*	*Maximum Duration of Any Effect*	*Maximum Value at End of Observation Period*
	1	2	3			
Erythema/Eschar	2	1	2	2	<14 Days	0
Oedema	1	0	1	1	<7 Days	0

*Calculated on the basis of the scores at 24, 48, and 72 hours for EACH animal.

Remarks - Results Very slight to well-defined erythema and very slight oedema were noted. Additional reactions reported included loss of skin flexibility and/or elasticity, light brown discolouration of the epidermis and slight desquamation.

CONCLUSION The notified chemical is irritating to the skin.

TEST FACILITY Harlan (2009g)

B.4. Irritation – eye

TEST SUBSTANCE Notified chemical

METHOD OECD TG 405 Acute Eye Irritation/Corrosion.
Species/Strain Rabbit/New Zealand White
Number of Animals 2
Observation Period 72 hours
Remarks - Method One drop of the local anaesthetic (tetracaine hydrochloride, 0.5%) was instilled into both eyes of the second animal 1-2 minutes before treatment.

RESULTS

Lesion	*Mean Score* Animal No.*		*Maximum Value*	*Maximum Duration of Any Effect*	*Maximum Value at End of Observation Period*
	1	2			
Conjunctiva: redness	1	1	2	<72 hrs	0
Conjunctiva: chemosis	0.3	0.3	2	<48 hrs	0
Conjunctiva: discharge	0.3	0.3	2	<48 hrs	0
Corneal opacity	0	0	0	-	0
Iridial inflammation	0	0	0	-	0

*Calculated on the basis of the scores at 24, 48, and 72 hours for EACH animal.

Remarks - Results No corneal or iridial effects were reported. Moderate conjunctival irritation was noted in treated eyes 1- and 24-hours post instillation with minimal irritation noted after 48 hours. The treated eyes were normal

after 72 hours.

CONCLUSION The notified chemical is slightly irritating to the eye.

TEST FACILITY Harlan (2009h)

B.5. Skin sensitisation – mouse local lymph node assay (LLNA)

TEST SUBSTANCE Notified chemical

METHOD OECD TG 429 Skin Sensitisation: Local Lymph Node Assay
Species/Strain Mouse/CBA/Ca (CBA/CaOlaHsd) Female
Vehicle Acetone/olive oil (4:1)
Remarks - Method A preliminary screening test was conducted using two mice (each tested at 100% or 50% concentration). The animal treated with 100% test substance was humanely killed, pre-dose on Day 2, following the observation of signs of systemic toxicity (including hunched posture, lethargy and splayed gait). No such signs were noted for the animal treated with 50% test substance.

Concurrent tests involving a positive control were not run, but had been conducted previously in the test laboratory.

RESULTS

Concentration (% w/w)	*Proliferative response (DPM/lymph node)*	*Stimulation Index (Test/Control Ratio)*
Test Substance		
0 (vehicle control)	1121.49	-
10	1843.08	1.64
25	4871.54	4.34
50	11110.74	9.91

Remarks - Results There were no mortalities and no signs of systemic toxicity or irritation noted for the test and control animals.

A stimulation index of >3 was recorded for the test substance at 25% concentration. Based on these results the EC_3 value is calculated to be 17.6%.

CONCLUSION There was evidence of induction of a lymphocyte proliferative response indicative of skin sensitisation to the notified chemical.

TEST FACILITY Harlan (2009i)

B.6. Repeat dose toxicity

TEST SUBSTANCE Notified chemical

METHOD OECD TG 407 Repeated Dose 28-day Oral Toxicity Study in Rodents.
Species/Strain
Route of Administration Oral – gavage
Exposure Information Total exposure days: 28 days
Dose regimen: 7 days per week
Vehicle Arachis oil BP
Remarks - Method Animals in the high dose group were administered 300 mg/kg bw/day (as opposed to 600 mg/kg bw/day) on days 1 and 2 to allow acclimatisation to the test material formulation.

RESULTS

Group	*Number and Sex of Animals*	*Dose mg/kg bw/day*	*Mortality*
control	5M/5F	0	0
low dose	5M/5F	30	0
mid dose	5M/5F	300	0
high dose	5M/5F	600	0

Clinical Observations

Hunched posture, tiptoe gait and lethargy were noted for females in the high dose group until day 10, ataxia noted until day 18 and prostration noted for a single female between days 15-17. For males of this group, hunched posture, prostration and decreased respiratory rate were noted on day 4, splayed gait and lethargy in a single male on day 7 and ataxia noted in a single male on days 7, 17, 18 and 28. Increased salivation and generalised fur loss were also observed but as these effects are frequently observed, these were deemed by the study authors to not be indicative of toxicity.

Observations noted for animals in the mid dose group included incidences of tiptoe/splayed gait, hunched posture, staining around the mouth and increased salivation.

Overall activity was reduced for animals in the high dose group and for males in the mid dose group. The study authors considered the reductions to be attributed to a slight decline in physical health and unrelated to neurotoxicity.

A slight reduction in bodyweight gain was noted for animals in the high dose group and for males in the mid dose group. However, there was no significant effect on dietary intake or food conversion efficiency.

No clinical observations were noted for animals in the low dose group.

Laboratory Findings – Clinical Chemistry, Haematology, Urinalysis

Significantly increased alanine aminotransferase and alkaline phosphatase levels were noted for males in the mid dose group. However, these were not considered by the study authors to represent an adverse effect of treatment.

Effects in Organs

No treatment-related macroscopic abnormalities were noted. Significant increases in absolute and relative liver weight were noted for animals in the high dose group and males in the mid dose group. The increases were not considered by the study authors to represent an adverse effect of treatment.

Microscopic examination revealed that treatment-related centrilobular hepatocyte enlargement was evident for animals in the high dose group and for males in the low and mid dose groups. This was considered by the study authors to be an adaptive response to treatment.

Increased adrenal weights (statistically significant) were observed in females at 30 and 300 mg/kg bw/day, but without a dose-response relationship. Thymus weights were also increased in females at 30 and 300 mg/kg bw/day.

CONCLUSION

The effects noted for animals in the low and mid dose groups were not considered by the study authors to be toxicologically significant. Therefore, the No Observed (Adverse) Effect Level (NO(A)EL) was established by the study authors as 300 mg/kg bw/day, based on the presence of toxicologically significant effects at the higher dosage levels.

TEST FACILITY Harlan (2010)

B.7. Genotoxicity – bacteria

TEST SUBSTANCE Notified chemical

METHOD OECD TG 471 Bacterial Reverse Mutation Test.
Plate incorporation procedure

Species/Strain	*S. typhimurium*: TA1535, TA1537, TA98, TA100 *E. coli*: WP2uvrA
Metabolic Activation System	Phenobarbitone/β-naphthoflavone-induced rat liver (S9 homogenate)
Concentration Range in Main Test	a) With metabolic activation: 50, 150, 500, 1500 and 5000 µg/plate b) Without metabolic activation: 50, 150, 500, 1500 and 5000 µg/plate
Vehicle	Dimethyl sulphoxide
Remarks - Method	A preliminary toxicity test (0-5000 µg/plate) was performed to determine the toxicity of the test material (TA100 and WP2uvrA) only. A range-finding study was then conducted using 6 concentrations of the test substance, assayed in triplicate against each tester strain (15-5000 µg/plate). The main study (Test 2) was conducted on a separate day to the range-finding study (Test 1) using fresh cultures of the bacterial strains and fresh test material formulations. Vehicle and positive controls were used in parallel with the test material. Positive controls: i) without S9: N-ethyl-N'-nitro-N-nitrosoguanidine (TA100, TA1535, WP2uvrA), 9-aminoacridine (TA1537) and 4-nitroquinoline-1-oxide (TA98); ii) with S9: 2-aminoanthracene (TA100, TA1535, TA1537, WP2uvrA) and benzo(a)pyrene (TA98).

RESULTS

Metabolic Activation	*Test Substance Concentration (µg/plate) Resulting in:*			
	Cytotoxicity in Preliminary Test	*Cytotoxicity in Main Test*	*Precipitation*	*Genotoxic Effect*
Absent				
Test 1	≥5000	≥5000	>5000	Negative
Test 2		≥5000	>5000	Negative
Present				
Test 1	>5000	≥5000	>5000	Negative
Test 2		≥5000	>5000	Negative

Remarks - Results	In the preliminary toxicity study, the test material was toxic to the TA100 strain at 5000 µg/plate without metabolic activation. In the mutation studies, the test substance caused a visible reduction in the growth of the bacterial background lawn to the TA100, TA1535, TA98 and TA1537 strains at 5000 µg/plate without metabolic activation and TA1535 and TA98 strains at 5000 µg/plate with activation. Thus, the material was tested up to the toxic limit. No significant increases in the frequency of revertant colonies were recorded for any of the bacterial strains up to and including the maximum dose, either with or without metabolic activation. The positive controls gave satisfactory responses, confirming the validity of the test system.
CONCLUSION	The notified chemical was not mutagenic to bacteria under the conditions of the test.
TEST FACILITY	Harlan (2009j)

B.8. Genotoxicity – in vitro

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 473 In vitro Mammalian Chromosome Aberration Test.

Species/Strain	Human
Cell Type/Cell Line	Lymphocytes
Metabolic Activation System	Phenobarbitone/β-naphthoflavone-induced rat liver (S9 homogenate)
Vehicle	Dimethyl sulphoxide
Remarks - Method	A preliminary toxicity study (8.05 to 2062 µg/mL) was performed to define the dose levels for the main test. A precipitate was observed at 2062 µg/mL. Vehicle and positive controls (cyclophosphamide and mitomycin C) were used in parallel with the test material.

Metabolic Activation	*Test Substance Concentration (µg/mL)*	*Exposure Period (h)*	*Harvest Time (h)*
Absent			
Test 1	64.44*, 128.88*, 257.75*, 515.5, 773.3, 1031	4	24
Test 2	16.11, 32.22*, 64.44*, 128.88*, 257.75*, 515.5	24	24
Present			
Test 1	64.44*, 128.88*, 257.75*, 515.5, 773.3, 1031	4	24
Test 2	64.44, 128.88*, 257.75*, 386.65*, 515.5, 773.3	4	24

*Cultures selected for metaphase analysis.

RESULTS

Metabolic Activation	*Test Substance Concentration (µg/mL) Resulting in:*			
	Cytotoxicity in Preliminary Test	*Cytotoxicity in Main Test*	*Precipitation*	*Genotoxic Effect*
Absent				
Test 1	≥515.5	≥515.5	>1031	Negative
Test 2		≥515.5	>515.5	Negative
Present				
Test 1	≥515.5	≥515.5	>1031	Negative
Test 2		≥515.5	>773.3	Negative

Remarks - Results	For the main experiments, precipitates were not observed at the end of the observation period. However, haemolysis was seen in all exposure groups (at ≥515.5 µg/mL in Test 1 and at ≥257.75 and ≥64.44 µg/mL in Test 2, with and without metabolic activation, respectively). No statistically significant increase in the number of cells with aberrations was noted at any test level, with and without metabolic activation. The positive and vehicle controls gave satisfactory responses, confirming the validity of the test system.
CONCLUSION	The notified chemical was not clastogenic to human lymphocytes treated in vitro under the conditions of the test.
TEST FACILITY	Harlan (2009k)

APPENDIX C: ENVIRONMENTAL FATE AND ECOTOXICOLOGICAL INVESTIGATIONS

C.1. Environmental Fate

C.1.1. Ready biodegradability

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 301 F Ready Biodegradability: Manometric Respirometry Test.
Inoculum	Activated sludge micro-organisms
Exposure Period	28 days
Auxiliary Solvent	None
Analytical Monitoring	The reduction in pressure from the adsorption of evolved carbon dioxide (CO_2) by soda lime was determined by an electrode type manometer.
Remarks - Method	In accordance with the guidelines above, the oxygen consumption of inoculated medium containing the test substance (100 mg/L) in darkened enclosed culture vessels was measured over 28 days. A reference control (sodium benzoate) and a toxicity control (sodium benzoate and test substance) were run in parallel. Biodegradation is expressed as the percentage oxygen uptake, corrected for the blank, of the theoretical uptake (ThOD). Test conditions were: pH 7.3-8.0.

RESULTS

Test substance		*Sodium benzoate*	
Day	*% Degradation*	*Day*	*% Degradation*
7	0	7	78
14	0	14	87
21	0	21	92
28	0	28	93

Remarks - Results	The percentage degradation of the reference compound (87%) surpassed the pass levels of 60% by 14 days thereby confirming the suitability of the sludge. The toxicity control achieved 36% degradation by Day 14 and, as this surpasses the pass level of 25%, the test material is considered non-inhibitory to the inoculum used in the study. As all acceptability criteria were fulfilled the test is considered valid. The test substance did not degrade after 28 days and is therefore not considered to be readily biodegradable.
CONCLUSION	The notified chemical is not readily biodegradable
TEST FACILITY	Harlan (2009l)

C.2. Ecotoxicological Investigations

C.2.1. Acute toxicity to aquatic invertebrates

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 202 *Daphnia* sp. Acute Immobilisation Test – Semi-static.
Species	*Daphnia magna*
Exposure Period	48 hours
Auxiliary Solvent	None
Water Hardness	250 mg $CaCO_3$/L
Analytical Monitoring	Test substance concentrations were determined by HPLC
Remarks - Method	After a range finding test, a definitive test at nominal concentrations 4.6, 10, 22, 46 and 100 mg /L was conducted according to the guidelines

above. Four replicates per concentration each had 5 daphnia added. The daphnia were observed for immobilisation every 24 hours over the course of the test. Test conditions were: 21 °C, 16 h/8 h light dark cycle, pH 7.8-8.1, and 8.2-8.6 mg O_2/L. Statistical values were determined directly from the raw data.

RESULTS

Concentration mg/L Nominal	*Number of D. magna*	*Number Immobilised*	
		24 h	*48 h*
0	4 × 5	0	0
4.6	4 × 5	0	0
10	4 × 5	0	0
22	4 × 5	0	0*
46	4 × 5	0	0*
100	4 × 5	0	1*

*Adverse effects observed (all tested daphnids discoloured and contourless)

EC50	>100 mg/L at 48 hours
NOEC	10 mg/L at 48 hours
Remarks - Results	After 48 hours there was no immobility in the dilution water control. As all acceptability criteria were fulfilled the test is considered valid. The measured concentrations of the notified chemical in the freshly prepared and aged test media were determined to be within 99 and 111% of the nominal values, thus the reported results are based on the nominal concentrations of the test substance. Adverse effects (daphnids discoloured and contourless) were observed in all daphnids at the test concentrations from 22 to 100 mg/L. Thus, the 48 h NOEC was determined to be 10 mg/L, as no effect was observed up to and including this test concentration.

CONCLUSION The notified chemical is not harmful to aquatic invertebrates

TEST FACILITY Harlan (2009m)

C.2.2. Algal growth inhibition test

TEST SUBSTANCE Notified chemical

METHOD OECD TG 201 Alga, Growth Inhibition Test.
EC Directive 92/69/EEC C.3 Algal Inhibition Test.

Species	*Pseudokirchneriella subcapitata* (formally known as *Selenastrum capricornutum)*
Exposure Period	72 hours
Concentration Range	Nominal: 0.1, 0.32, 1.0, 3.2, 10, 32 and 100 mg/L Actual: 7.1, 23 and 92 mg/L* *Geometric mean of test substance concentrations at start and end of test for the three highest test concentrations.
Auxiliary Solvent	None
Water Hardness	24 mg $CaCO_3$/L
Analytical Monitoring	Test substance concentrations were determined by HPLC(UV).
Remarks - Method	A definitive test at nominal concentrations 0.1, 0.32, 1.0, 3.2, 10, 32 and 100 mg/L (in triplicate) was conducted to assess the affect of the test substance on the growth of unicellular green algae, according to the guidelines above. Test conditions were: 22-23 °C, continuous illumination, pH 8.0-8.9. Statistical values were determined by Dunnett's test and Probit analysis.

RESULTS

Biomass		*Growth*	
E_bC_{50} mg/L at 72 h	*NOEC mg/L*	*E_rC_{50} mg/L at 72 h*	*NOEC mg/L*
32 (95% CI: 30-35)	7.1	87 (95% CI: 85-90)	7.1

Remarks - Results: In the control the biomass increased by a factor of over 118 and, as other validity criteria were satisfied, the test is considered valid.

During the test period of 72 hours, a decrease of the test substance concentration in the test media occurred. At the end of the test, 50 to 86% of the nominal values were found. Thus the reported results are based on the mean measured concentration.

CONCLUSION: The notified chemical is harmful to algae

TEST FACILITY: Harlan (2009n)

C.2.3. Inhibition of microbial activity

TEST SUBSTANCE: Notified chemical

METHOD: OECD TG 209 Activated Sludge, Respiration Inhibition Test.
EC Directive 88/302/EEC C.11 Biodegradation: Activated Sludge Respiration Inhibition Test

Inoculum: Activated sludge from a predominantly domestic sewage treatment works
Exposure Period: 3 hours
Concentration Range: Nominal: 10, 32, 100, 320 and 1000 mg/L
Remarks – Method: In accordance with the guidelines above, inoculated media containing synthetic sewage feed and test substance at nominal concentrations of 10, 32, 100, 320 and 1000 mg/L were evaluated for their effect on respiration rates of activated sewage sludge after 3 hours. Inoculated media containing synthetic sewage feed and reference material (3,5-dichlorophenol), at concentrations of 3.2, 10 and 32 mg/L, and inoculum controls were run in parallel.
The inhibitory effects of the test substance and the reference substance on the respiration rates of activated sludge are expressed as percentages of the mean respiration rate of the controls. Test conditions were: 21 °C, pH 7.5 - 8.1, 140 mg $CaCO_3$/L. Statistical values were determined by Litchfield and Wilcoxon Method.

RESULTS

IC50: 390 mg/L (95% CI: 320-470 mg/L)
NOEC: 190 mg/L
Remarks – Results: As the difference between the two controls was below 15% and the IC50 of the reference substance (5.5 mg/L) was between 5 and 30 mg/L, the test was considered valid.
Under the experimental conditions the 3 hour IC50 is >100 mg/L for activated sludge and, therefore, the test substance is considered as not harmful to micro-organisms in water treatment plants.

CONCLUSION: The notified chemical is not inhibitory to microbe respiration

TEST FACILITY: Harlan (2009o)

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