File No: LTD/1789

October 2014

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

PUBLIC REPORT

Sarrioxane

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (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 conducts the risk assessment for public health and occupational health and safety. The assessment of environmental risk is conducted by the Department of the Environment.

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

This 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:

Street Address:	Level 7, 260 Elizabeth Street, SURRY HILLS NSW 2010, AUSTRALIA.
Postal Address:	GPO Box 58, SYDNEY NSW 2001, AUSTRALIA.
TEL:	+ 61 2 8577 8800
FAX:	+ 61 2 8577 8888
Website:	www.nicnas.gov.au

Director
NICNAS

TABLE OF CONTENTS

SUMMARY

The following details will be published in the NICNAS *Chemical Gazette:*

ASSESSMENT REFERENCE	APPLICANT(S)	CHEMICAL OR TRADE NAME	HAZARDOUS CHEMICAL	INTRODUCTION VOLUME	USE
LTD/1789	Firmenich Limited	Sarrioxane	Yes	≤ 1 tonne per annum	Fragrance ingredient

CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification
Based on the available information, the notified chemical is recommended for hazard classification according to the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS),* as adopted for industrial chemicals in Australia. The recommended hazard classification is presented in the table below.

Hazard classification	*Hazard statement*
Flammable Liquids (Category 4)	H227 – Combustible liquid
Serious eye damage/eye irritation (Category 2B)	H320 – Causes eye irritation

Based on the available information, the notified chemical is not recommended for classification according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

Human health risk assessment
Provided that the recommended controls are being adhered to, under the conditions of the occupational settings described, the notified chemical is not considered to pose an unreasonable risk to the health of workers.

Based on the available information, when used at ≤ 0.1% in cosmetic, personal care and household products, the notified chemical is not considered to pose an unreasonable risk to public health.

Environmental risk assessment
On the basis of the PEC/PNEC ratio and the assessed use pattern, the notified chemical is not considered to pose an unreasonable risk to the environment.

Recommendations

REGULATORY CONTROLS

Hazard Classification and Labelling

- The notified chemical should be classified as follows:
  - Flammable Liquids (Category 4): H227 – Combustible liquid
  - Serious eye damage/eye irritation (Category 2B): H320 – Causes eye irritation

The above should be used for products/mixtures containing the notified chemical, if applicable, based on the concentration of the notified chemical present and the intended use/exposure scenario.

CONTROL MEASURES

Occupational Health and Safety

- A person conducting a business or undertaking at a workplace should implement the following engineering controls to minimise occupational exposure to the notified chemical during reformulation process:
  - Enclosed, well-ventilated automated process, where possible.

- A person conducting a business or undertaking at a workplace should implement the following safe work practices to minimise occupational exposure during handling of the notified chemical during handling of unfinished product undergoing reformulation process at a concentration of up to > 90%:
  - Avoid contact with skin and eyes and inhalation of vapours

- A person conducting a business or undertaking at a workplace should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified chemical during reformulation process:
  - Coveralls, impervious gloves, goggles
  - respiratory protection, if significant inhalation exposure is expected

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

- A copy of the (M)SDS should be easily accessible to employees.

- If products and mixtures containing the notified chemical are classified as hazardous to health in accordance with the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS)* as adopted for industrial chemicals in Australia, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation should be in operation.

Public Health

- The following measures should be taken to minimise public exposure to the notified chemical:
  - The notified chemical should only be used at ≤ 0.1% in cosmetic, personal care and household products.

Disposal

- Where reuse or recycling are not available or appropriate, dispose of the notified chemical in an environmentally sound manner in accordance with relevant Commonwealth, state, territory and local government legislation.

Storage

- The handling and storage of the notified chemical should be in accordance with the Safe Work Australia Code of Practice for *Managing Risks of Hazardous Chemicals in the Workplace* (SWA, 2012) or relevant State or Territory Code of Practice.

Emergency procedures

- Spills or accidental release of the notified chemical should be handled by 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;

- the concentration of the notified chemical exceeds or is intended to 0.1% concentration in cosmetic and household products;
- information becomes available on the repeated dose toxicity of the notified chemical.

or

(2) Under Section 64(2) of the Act; if

- the function or use of the chemical has changed from a fragrance ingredient, or is likely to change significantly;
- the amount of chemical being introduced has increased, or is likely to increase, 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 (M)SDS of the notified chemical provided by the notifier was reviewed by NICNAS. The accuracy of the information on the (M)SDS remains the responsibility of the applicant.

ASSESSMENT DETAILS

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
Firmenich Limited (ABN: 86 002 964 794)
73 Kenneth Road
BAGOWLAH 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, additives/adjuvants and use details.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
Variation to the schedule of data requirements is claimed as follows: Adsorption/desorption, dissociation constant, flammability limits, explosive properties, oxidising properties and reactivity.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None

NOTIFICATION IN OTHER COUNTRIES
USA (2003), Europe (2003), Philippines (2006) and Switzerland (2006)

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
Sarrioxane

MOLECULAR WEIGHT
< 200 Da

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

3. COMPOSITION

DEGREE OF PURITY
> 90%

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: Colourless liquid

Property	Value	Data Source/Justification
Melting Point/Freezing Point	< –20 °C	Measured
Boiling Point	191 °C at 99.7 kPa	Measured
Relative Density	0.973 at 20 °C	Measured
Vapour Pressure	9.54×10^{-2} kPa at 25 °C	Measured
Water Solubility	1.65g/L at 20 °C	Measured
Hydrolysis as a Function of pH	Hydrolytically stable	Measured
Partition Coefficient (n-octanol/water)	log Pow = 3.12	Measured
Adsorption/Desorption	log K_{oc} = 2.1 (MCI and Kow methods)	Calculated. KOCWIN v2.0, EPI Suite v4.1 (US EPA, 2010).
Dissociation Constant	Not determined	Does not contain dissociable functionality.
Flash Point	65 ± 2 °C at 101.3 kPa	Measured
Autoignition Temperature	205 °C	Measured

Explosive Properties	Not determined	Contains no functional groups that would imply explosive properties
Oxidising Properties	Not determined	Contains no functional groups that would imply oxidative 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.

Physical hazard classification
Based on the submitted physico-chemical data depicted in the above table, the notified chemical is recommended for hazard classification according to the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS),* as adopted for industrial chemicals in Australia. The recommended hazard classification is presented in the following table.

Hazard classification	***Hazard statement***
Flammable Liquids (Category 4)	H227 – Combustible liquid

5. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS
The notified chemical will not be manufactured in Australia. The notified chemical will be imported into Australia in the following forms: as a pure chemical to be blended into fragrance formulations or end-use products, as a component of fragrance formulations to be blended into end-use products, or as a component of end-use products.

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

TRANSPORTATION AND PACKAGING
The notified chemical will be imported in lacquered drums of varying sizes ranging from 5 kg to 180 kg. Transport from notifier's site to the customer's site will be by road. End-use products containing the notified chemical will be packaged in a variety of container sizes depending on the product and transported by road to retail outlets for sale.

USE
The notified chemical will be used as a fragrance ingredient in a wide variety of cosmetic, personal care and household products. The maximum concentration of the notified chemical in end-use products will be 0.1%.

OPERATION DESCRIPTION
The notified chemical will not be manufactured within Australia.

Reformulation
The notified chemical will be formulated into either fragrance formulas or fragranced end-products. The procedures for incorporating the notified chemical into end-use products will likely vary depending on the nature of the cosmetic and household products 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 into containers of various sizes. During the reformulation processes, samples of the notified chemical and the finished cosmetic products may be taken for quality control testing.

End-use
The finished cosmetic and personal care products containing the notified chemical (at ≤ 0.1% concentration) may be used by consumers and professionals such as hairdressers and 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.

Cleaning and washing products containing the notified chemical (at ≤ 0.1% concentration) may be used by consumers and professional workers. The products may be used in either closed systems with episodes of controlled exposure, for example automatic washing machines, or open processes and manually applied by rolling, brushing, spraying and dipping. The cleaning and washing liquids will be completely discharged into industrial sewerage systems after use.

The finished cosmetic products containing the notified chemical at ≤ 0.1% concentration will be used by consumers and professionals (such as beauticians and hairdressers). Depending on the nature of the product, application of products could be by hand, sprayed or through the use of an applicator.

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment

6.1.1. Occupational Exposure

CATEGORY OF WORKERS

Category of Worker	*Exposure Duration (hours/day)*	*Exposure Frequency (days/year)*
Transport & warehouse workers	Unknown	Unknown
Plant operators – mixing	4	2
Plant operators – drum handling	4	2
Plant operators – drum cleaning	4	2
Plant operators – maintenance	4	2
Plant operators – quality control	0.5	1
Plant operators – packaging	4	2

EXPOSURE DETAILS

Transport and storage

The primary work activity undertaken by transport and warehouse workers will include the handling, loading and off-loading of drums containing the notified chemicals in pure form (at a concentration > 90%) or as a constituent of a formulated product. Exposure will be limited to an event of an accidental discharge, clean up from a spill or leaking drum. If such an event occurs, a worker may be exposed to the notified chemical at a concentration of up to 100% through dermal or ocular contact. The notifier states that exposure will be minimised through the use of personal protective equipment (PPE) including overalls, hard hats, chemical resistant gloves and safety glasses.

Formulation of end products

During reformulation dermal, ocular and perhaps inhalation exposure of workers to the notified chemicals (at up to 100% concentration) may occur during weighing and transfer stages, blending, quality control analysis and cleaning and maintenance of equipment. The notifier anticipates that typical practices by cosmetic and consumer product manufacturers will include enclosed mixing vessels and filling areas, local ventilation, a high degree of automation and the use of PPE such as overalls, safety glasses and impervious gloves by plant operators.

Beauty care and cleaning professionals

Exposure to the notified chemical in end-use products (at ≤ 0.1% concentration) may occur in professions where the services provided involve the application of cosmetic and personal care products to clients (e.g. hair dressers and workers in beauty salons) or the use of household products in the cleaning industry. The principal route of exposure will be dermal, while ocular and inhalation exposure is also possible. Such professionals may use some PPE to minimise repeated exposure, but use is not expected. However, 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 a widespread and repeated exposure of the public to the notified chemical (at up to 0.1% concentration) through the use of a wide range of cosmetic, personal care and household products. The principal

routes of exposure will be dermal, while ocular, oral (during facial use) and inhalation exposures (through the use spray products) are also possible.

6.2. Human Health Effects Assessment

The results from toxicological investigations conducted on the notified chemical are summarised in the following table. For full details of the studies, refer to Appendix B.

Endpoint	*Result and Assessment Conclusion*
Rat, acute oral toxicity	LD50 > 2,000 mg/kg bw; low toxicity
Rabbit, skin irritation	slightly irritating
Rabbit, eye irritation	irritating
Guinea pig, skin sensitisation – adjuvant test.	no evidence of sensitisation
Mutagenicity – bacterial reverse mutation	non mutagenic

Toxicokinetics, metabolism and distribution.
No toxicokinetics, metabolism and distribution studies were submitted for the notified chemical. Based on the low molecular weight (< 200 Da) and the moderate to high water solubility (1.65 g/L at 20 °C) and partition coefficient (log Pow = 3.12) there is a high probability for the chemical to be dermally absorbed (ECHA 2012).

Acute toxicity.
The notified chemical was found to have low acute toxicity via the oral route when tested at a concentration of 2,000 mg/kg body weight with a purity of > 90%. No toxicity data were provided for acute dermal and inhalation exposure.

Irritation and sensitisation.
The notified chemical was to be slightly irritating to the skin and irritating to the eyes of rabbits when tested in pure form (concentration > 90%).

Guinea pig maximisation test was carried out to assess the skin sensitising potential of the notified chemical. The animals were exposed to the notified chemical at a concentration of 5% with and without adjuvant intradermaly followed by exposure in pure form (concentration > 90%) topically. Development of dermal sensitivity was assessed 21 days after first exposure by exposing the test animals at a naïve dermal site to the notified chemical at a concentration of 75% in mineral oil. There was no evidence of skin sensitisation observed at the concentration tested.

Repeated dose toxicity.
No data on repeated dose toxicity was provided for the notified chemical.

Mutagenicity/Genotoxicity.
The notified chemical was not mutagenic in an *in vitro* bacterial mutation test when tested at the highest recommended dose of 5,000 µg/plate.

Health hazard classification
Based on the available information, the notified chemical is recommended for hazard classification according to the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS),* as adopted for industrial chemicals in Australia. The recommended hazard classification is presented in the following table.

Hazard classification	***Hazard statement***
Serious eye damage/eye irritation (Category 2B)	H320 – Causes eye irritation

Based on the available information, the notified chemical is not recommended for classification according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

6.3. Human Health Risk Characterisation

6.3.1. Occupational Health and Safety

Reformulation
The notified chemical has the potential to cause skin and eye irritation effects. The notified chemical was of low acute toxicity, however due to a lack of repeated dose toxicity, harmful effects following repeated exposure to

the notified chemical cannot be ruled out. Therefore, caution should be exercised when handling the notified chemical during reformulation processes.

Workers may experience dermal and accidental ocular and perhaps inhalation exposure to the notified chemical (at a concentration of up to 100%) during the reformulation process. The recommended use of enclosed, automated processes and PPE (impervious gloves, goggles, coveralls and respiratory protection, if significant inhalation exposure is expected) by the workers should minimise the potential exposure.

Provided that the recommended 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 unreasonable.

End-use
Cleaners and beauty care professionals will handle the notified chemical at ≤ 0.1% concentration, similar to public use. The risk to these workers is expected to be of a similar or lesser extent than that experienced by consumers using products containing the notified chemical on a regular basis.

6.3.2. Public Health
Members of the public may be repeatedly exposed to the notified chemical during the use of cosmetic, hair care, personal care, air-care and household products containing the notified chemical at concentrations up to 0.1%.

Irritation
The notified chemical is slightly irritating to the skin and irritating to the eye but considering the very low concentration (< 0.1%) to be used in the cosmetic, personal care and household products, the risk to the public from the use of the notified chemical is not considered unreasonable.

Repeat dose toxicity
The repeated dose toxicity effects of the notified chemical have not been determined. However, exposure is expected to be limited by the low concentrations of the notified chemical in end use products.

Therefore, based on the information available, the risk to the public associated with the use of the notified chemical in cosmetic, personal care and household products at ≤ 0.1% concentration, is not considered to be unreasonable. In the absence of data on the repeat dose toxicity potential of the notified chemical, use of the notified chemical is supported only under limited exposure conditions, which are reflected in the low concentration of the notified chemical in end-use products.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Environmental Exposure & Fate Assessment

7.1.1. Environmental Exposure

RELEASE OF CHEMICAL AT SITE
The notified chemical will not be manufactured in Australia; therefore there is no release of the notified chemical to the environment from this activity. Environmental release during importation, transport and distribution may occur as a result of accidental spills. In the event of a spill, the notified chemical is expected to be contained and collected with an inert absorbent material and disposed of in accordance with local regulations.

During reformulation processes, limited release of the notified chemical is expected from cleaning of equipment as washings will be reused. A total of up to 0.2% of the import volume is estimated to be generated as waste from residues in empty containers and spills during reformulation. Empty containers containing the notified chemical will either be recycled or disposed of through an approved waste management facility.
RELEASE OF CHEMICAL FROM USE
The majority of the notified chemical is expected to be released to sewers across Australia as a result of its use in cosmetic and domestic products, which are washed off the hair and skin of consumers as well as from cleaning activities and disposed of to the sewer.

RELEASE OF CHEMICAL FROM DISPOSAL
It is expected that some of the product containing the notified chemical will remain in end-use containers. The containers are expected to be disposed of through domestic garbage disposal and will enter landfill, or be subjected to recycling processes.

7.1.2. Environmental Fate

Following its use in Australia, the majority of the notified chemical is expected to enter the sewer system before potential release to surface waters on a nationwide basis. The notified chemical is hydrolytically stable based on the study provided. The biodegradation study indicated that the notified chemical is not considered to be rapidly degradable in the environment and hence, it is not expected to be significantly degraded during the wastewater treatment process. For the details of the environmental fate studies please refer to Appendix C. Based on its predicted low adsorption coefficient value (log K_{oc} = 2.1), only limited partitioning to sludge is expected. The notified chemical has low potential to bioaccumulate based on its low partition coefficient (log Pow = 3.12). In surface waters, the notified chemical is expected to disperse and degrade through biotic and abiotic processes to form water and oxides of carbon and sulphur.

The notified chemical is expected to have low volatility from water (log H = 1.7 Pa/m^3/mol) and may not significantly volatilise to air during use or sewage treatment based on calculations for a representative component of the notified chemical. In the event of release to the atmosphere, the notified chemical is not expected to persist in the air compartment based on calculations (AOPWIN v1.92; US EPA, 2011) for a representative component of the notified chemical.

A proportion of notified chemical may be applied to land when effluent is used for irrigation, or disposed of to landfill as waste. Notified chemical residues in landfill and soils are expected to have moderate mobility based on its low soil adsorption coefficient. In the aquatic and soil compartments, the notified chemical is expected to slowly degrade through biotic and abiotic processes to form water and oxides of carbon and sulphur.

7.1.3. Predicted Environmental Concentration (PEC)

The calculation for the Predicted Environmental Concentration (PEC) is summarised in the table below. Based on the reported use in cosmetics and household cleansing products, it is assumed that 100% of the total import volume of the notified chemical is released to the sewer. The release is assumed to be nationwide over 365 days per year. It is conservatively assumed that 0% of the notified chemical will be removed during sewage treatment processes.

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)	22.613	million
Removal within STP	0%	
Daily effluent production:	4,523	ML
Dilution Factor - River	1.0	
Dilution Factor - Ocean	10.0	
PEC - River:	0.61	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 0.61 µg/L may potentially result in a soil concentration of approximately 4.0 µg/kg from each year of irrigation. 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 20.2 µg/kg and 40.4 µg/kg, respectively.

7.2. Environmental Effects Assessment

No ecotoxicity data for the notified chemical were submitted. The ecotoxicity effects of the notified chemical were predicted using Ecological Structure Activity relationship (ECOSAR v1.11, US EPA 2012). The conservative toxicity results are summarised in the table below.

Endpoint	Result	Assessment Conclusion
Fish	LC50 (96 h) = 69.04 mg/L	Expected to be harmful to fish

Daphnia	LC50 (48 h) = 40.4 mg/L	Expected to be harmful to aquatic invertebrates
Algae	EC_r50 (96 h) = 33.9 mg/L	Expected to be harmful to algae

The ECOSAR estimation endpoints indicate that the notified chemical is expected to be harmful to fish, daphnia and algae. Therefore, the notified chemical is potentially harmful to aquatic organisms. However, the actual toxicity of the notified chemical to aquatic life may be overestimated by ECOSARs estimation used here as surface waters tend to have higher total organic content (TOC) and dissolved organic content (DOC) than what is used in standard aquatic toxicity testing media. Classification should be based on actual toxicity endpoints and, therefore, the notified chemical cannot be formally classified under the Globally Harmonised System of Classification and Labelling of Chemicals (GHS) (United Nations, 2009).

7.2.1. Predicted No-Effect Concentration

The predicted endpoint for the most sensitive species (Algae, E_rC50) was used to calculate the predicted no-effect concentration (PNEC) for the notified chemical. An assessment factor of 1000 was used as measured ecotoxicological endpoints were not available for the notified chemical.

Predicted No-Effect Concentration (PNEC) for the Aquatic Compartment		
EC_r50 (Alga)	33.9	mg/L
Assessment Factor	1,000	
PNEC:	33.9	µg/L

7.3. Environmental Risk Assessment

The Risk Quotient values have been calculated as follows:

Risk Assessment	***PEC µg/L***	***PNEC µg/L***	***Q***
Q - River:	0.61	33.9	0.018
Q - Ocean:	0.06	33.9	0.002

The risk quotient for discharge containing the notified chemical to the aquatic environment indicates that the notified chemical is unlikely to reach ecotoxicologically significant concentrations based on its reported use pattern and annual importation quantity. The notified chemical has low potential for bioaccumulation. Therefore, on the basis of the PEC/PNEC ratio, maximum annual import volume and assessed use pattern in cosmetic and household products, the notified chemical is not expected to pose an unreasonable risk to the environment.

APPENDIX A: PHYSICAL AND CHEMICAL PROPERTIES

Melting Point/Freezing Point < –20 °C

Method OECD TG 102 Melting Point/Melting Range.
Remarks Determination of crystallizing point method. Determination carried out in duplicate
Test Facility SafePharm (2003a)

Boiling Point 191 °C at 99.7 kPa

Method OECD TG 103 Boiling Point.
Remarks Differential scanning method. Determination carried out in duplicate
Test Facility SafePharm (2003a)

Relative Density 0.973 at 20 °C

Method EC Council Regulation No 92/69/EEC A.3 Relative Density.
Remarks Oscillating density meter method. Determination carried out in triplicate
Test Facility Firmenich (2002)

Vapour Pressure 9.54×10^{-2} kPa at 25 °C

Method OECD TG 104 Vapour Pressure.
Remarks The saturated vapour pressure has been was calculated at 25 °C using Antoine equation
Test Facility Firmenich (2014)

Water Solubility 1.65g/L at 20 °C

Method EC Council Regulation No 440/2008 A.6 Water Solubility.
Remarks Flask Method
Test Facility SafePharm (2003a)

Hydrolysis as a Function of pH Hydrolytically stable

Method OECD TG 111: Hydrolysis as a Function of pH.

pH	*T (°C)*	*$t_{½}$ < days>*
2	25	Not reported
5	25	Not reported
7	25	Not reported
8.5	25	Not reported
12	25	Not reported

Remarks The concentration of the test substance after 5 days is less than 10% at pH 5, 7, 8.5 and 12 at 40 °C. Therefore, the test substance is considered hydrolytically stable according to the criterion in data reporting guidelines for hydrolysis studies according to this test.
Test Facility SafePharm (2003a)

Partition Coefficient (n-octanol/water) log Pow = 3.12

Method EC Council Regulation No 440/2008 A.8 Partition Coefficient.
Remarks HPLC Method
Test Facility SafePharm (2003a)

APPENDIX B: TOXICOLOGICAL INVESTIGATIONS

B.1. Acute toxicity – oral

TEST SUBSTANCE: Notified chemical

METHOD: OECD TG 423 Acute Oral Toxicity – Acute Toxic Class Method.
- Species/Strain: Rat/Sprague-Dawley CD
- Vehicle: None
- Remarks - Method: No significant protocol deviations.

RESULTS

Group	*Number and Sex of Animals*	*Dose mg/kg bw*	*Mortality*
1	3 females	2,000	0/3
2	3 females	2,000	0/3

- LD50: > 2,000 mg/kg bw
- Signs of Toxicity: Hunched posture was noted in all test subjects immediately after administration of test substance which was reversed by day 2. Ataxia was observed 4 hours after administration. Pilo-erection was seen in 3 test subjects. One of the test subjects also showed red/brown staining around the eyes, slayed gait, lethargy, decreased respiratory rate and laboured respiration. All the test subjects appeared normal 2 days after dosing.
- Effects in Organs: No abnormalities were noted at necropsy.
- Remarks - Results: All animals showed expected bodyweight gains.

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

TEST FACILITY: SafePharm (2003c)

B.2. Irritation – skin

TEST SUBSTANCE: Notified chemical

METHOD: OECD TG 404 Acute Dermal Irritation/Corrosion.
- Species/Strain: Rabbit/New Zealand White
- Number of Animals: 3 Male
- Vehicle: None
- Observation Period: 7 days
- Type of Dressing: Semi-occlusive.
- Remarks - Method: No significant protocol deviations.

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	1.0	1.7	0.7	2	< 7 days	0
Oedema	0.7	0.7	0.3	1	< 72 hours	0

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

- Remarks - Results: Very slight erythema was noted at all treated sites one hour after patch removal with a well-defined erythema at 2 test sites at 24 hour observation. Slight desquamation was noted in one treated skin site at the 7 day observation.

CONCLUSION: The notified chemical is slightly irritating to the skin.

TEST FACILITY SafePharm (2003d)

B.3. Irritation – eye

TEST SUBSTANCE Notified chemical

METHOD OECD TG 405 Acute Eye Irritation/Corrosion.
Species/Strain Rabbit/New Zealand White
Number of Animals 3 Male
Observation Period 7 days
Remarks - Method No significant protocol deviations.

RESULTS

Lesion	*Mean Score* Animal No.*			*Maximum Value*	*Maximum Duration of Any Effect*	*Maximum Value at End of Observation Period*
	1	2	3			
Conjunctiva: redness	2.0	2.0	2.0	2	72 h	0
Conjunctiva: chemosis	1.7	1.0	2.0	2	72 h	0
Conjunctiva: discharge	2.3	1.0	2.7	3	72 h	0
Corneal opacity	0.7	0.0	1.0	1	72 h	0
Iridial inflammation	0.7	0.0	1.0	1	72 h	0

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

Remarks - Results Diffuse corneal opacity and iridial inflammation were noted in two treated eyes at 24 and 48 hour observations and persisted in one eye at the 72 hour observation. Moderate conjunctival irritation was noted in all treated eyes one hour after treatment and at subsequent 24, 48 and 72 hour observations.

CONCLUSION The notified chemical is irritating to the eye.

TEST FACILITY SafePharm (2003e)

B.4. Skin sensitisation

TEST SUBSTANCE Notified chemical

METHOD OECD TG 406 Skin Sensitisation – Magnusson-Kligman Method.
Species/Strain Guinea pig/Hartley Albino
PRELIMINARY STUDY Maximum Non-irritating Concentration: 75%
intradermal: 5% in mineral oil
topical: 100%
MAIN STUDY
Number of Animals Test Group: 20 Control Group: 10
INDUCTION PHASE Induction Concentration:
intradermal: 5% in mineral oil & 5% in 50% Freund's adjuvant
topical: 100%
Signs of Irritation Faint erythema one hour after removal of application patch.
CHALLENGE PHASE topical: 75% in mineral oil
Remarks - Method No significant protocol deviations.

RESULTS

Animal	*Challenge Concentration*	*Number of Animals Showing Skin Reactions after: 1st challenge*	
		24 h	*48 h*
Test Group	75%	4/20	0/20
Control Group	75%	3/10	0/10

Remarks - Results	All the test animals showed faint erythema after topical application of the test substance during induction phase. During the challenge phase, 4 out of 20 test group animals and 3 out of 10 control group animals showed very faint erythema (0.5). All the test sites in control and test groups appeared normal at 48 hour observation.
CONCLUSION	There was no evidence of reactions indicative of skin sensitisation to the notified chemical under the conditions of the test.
TEST FACILITY	PSL (2003)

B.5. 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 & TA102
Metabolic Activation System	S9 mix prepared from the livers of phenobarbital/β-naphthoflavone induced male Sprague-Dawley rats.
Concentration Range in Main Test	a) With metabolic activation: 50–5,000 µg/plate b) Without metabolic activation: 50–5,000 µg/plate
Vehicle	Dimethyl sulfoxide
Remarks - Method	No significant protocol deviations. Vehicle and positive controls were used in parallel. N-ethyl-N'-nitro-N-nitrosoguanidine, 9-Aminoacridine, Mitomycin C and 4-Nitroquinoline-1-oxide were used as positive controls for experiments without metabolic activation and 2-Aminoanthracine, Benzo(a)pyrene and 1,8-Dihydroxyanthraquinone were used as positive controls in experiments with metabolic activation.

RESULTS

Metabolic Activation	*Test Substance Concentration (µg/plate) Resulting in:*		
	Cytotoxicity in Main Test	*Precipitation*	*Genotoxic Effect*
Absent			
Test 1	> 5,000	> 5,000	Negative
Test 2	> 5,000	> 5,000	Negative
Present			
Test 1	> 5,000	> 5,000	Negative
Test 2	> 5,000	> 5,000	Negative

Remarks - Results	No significant increases in the frequency of revertant colonies were recorded for any of the bacterial strains, with any dose of test substance, either with or without metabolic activation. The positive and vehicle controls produced satisfactory responses when compared to historical values of the test facility.
CONCLUSION	The notified chemical was not mutagenic to bacteria under the conditions of the test.
TEST FACILITY	SafePharm (2002)

APPENDIX C: ENVIRONMENTAL FATE AND ECOTOXICOLOGICAL INVESTIGATIONS

C.1. Environmental Fate

C.1.1. Ready biodegradability

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 301 D Ready Biodegradability: Closed Bottle Test.
Inoculum	Activated Sludge
Exposure Period	28 days
Auxiliary Solvent	None
Analytical Monitoring	Oxygen electrode to measure the dissolved oxygen
Remarks - Method	The test was conducted according to the guidelines above and good laboratory practice (GLP) principles. No significant deviations from the test guidelines were reported.

RESULTS

Test substance		*Sodium acetate*	
Day	*% Degradation (BOD)*	*Day*	*% Degradation (BOD)*
3	3	3	55
14	3	14	70
28	7	28	72

Remarks - Results	All validity criteria for the test were satisfied. The reference compound, sodium benzoate, achieved 70% degradation by Day 14, and therefore the test is considered valid for this criterion. The toxicity control achieved 25% degradation by Day 14 and, hence the test material is considered non-inhibitory to the inoculum used in the study. The degree of degradation of the notified chemical after the cultivation period was 7%. Therefore, the test substance is classified as not readily biodegradable according to the OECD (301 D) guideline.
CONCLUSION	The notified chemical is not readily biodegradable
TEST FACILITY	SafePharm (2003f)

BIBLIOGRAPHY

ECHA (2012) Guidance on information requirements and chemical safety assessment Chapter R.7c: Endpoint specific guidance, November 2012, version 1.1. European Chemicals Agency <http://echa.europa.eu/documents/10162/13632/information_requirements_r7c_en.pdf>. Accessed 6 August 2015.

Firmenich (2003) [Notified chemical] Determination of General Physico-Chemical Properties: Melting/Freezing Temperature, Boiling Temperature, Relative Density and Flash Point (Study No. R003-05.2002, June, 2002). La Plaine, Geneva, Switzerland, Firmenich, Laboratory of Analysis and Measurements (Unpublished report submitted by the notifier).

Firmenich (2014) [Notified chemical] Determination of Vapour Pressure (Study No. 110432-DMR, June, 2014). La Plaine, Geneva, Switzerland, Firmenich, Laboratory of Analysis and Measurements (Unpublished report submitted by the notifier).

NOHSC (2004) Approved Criteria for Classifying Hazardous Substances, 3rd edition [NOHSC:1008(2004)]. National Occupational Health and Safety Commission, Canberra, AusInfo.

NTC (National Transport Commission) 2007 Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG code), 7th Edition, Commonwealth of Australia

PSL (2003) [Notified chemical] Dermal Sensitization Test – Magnusson-Kligman Method (Study No. 12877, January, 2003). New Jersey, USA, Product Safety Laboratories (Unpublished report submitted by the notifier).

SafePharm (2002) [Notified chemical] Reverse Mutation Assay "Ames Test" Using Salmonella Typhimurium (Study No. 161/346, July, 2002). Derbyshire, U.K., Safepharm Laboratories Limited (Unpublished report submitted by the notifier).

SafePharm (2003a) [Notified chemical] Determination of General Physico-Chemical Properties: Melting/Freezing Temperature, Boiling Temperature, Water Solubility and Partition Coefficient (Study No. 161/367, January, 2003). Derbyshire, U.K., Safepharm Laboratories Limited (Unpublished report submitted by the notifier).

SafePharm (2003b) [Notified chemical] Determination of Flash Point (Study No. 161/368, January, 2003). Derbyshire, U.K., Safepharm Laboratories Limited (Unpublished report submitted by the notifier).

SafePharm (2003c) [Notified chemical] Determination of Acute Oral Toxicity in The Rat – Acute Toxic Class Method (Study No. 161/369, January, 2003). Derbyshire, U.K., Safepharm Laboratories Limited (Unpublished report submitted by the notifier).

SafePharm (2003d) [Notified chemical] Acute Dermal Irritation in The Rabbit (Study No. 161/370, January, 2003). Derbyshire, U.K., Safepharm Laboratories Limited (Unpublished report submitted by the notifier).

SafePharm (2003e) [Notified chemical] Acute Eye Irritation in The Rabbit (Study No. 161/371, January, 2003). Derbyshire, U.K., Safepharm Laboratories Limited (Unpublished report submitted by the notifier).

SafePharm (2003f) [Notified chemical] Assessment of Ready Biodegradability; Closed Bottle Test (Study No. 161/383, May, 2003). Derbyshire, U.K., Safepharm Laboratories Limited (Unpublished report submitted by the notifier).

SWA (2012) Code of Practice: Managing Risks of Hazardous Chemicals in the Workplace, Safe Work Australia, http://www.safeworkaustralia.gov.au/sites/swa/about/publications/pages/managing-risks-of-hazardous-chemicals-in-the-workplace.

United Nations (2009) Globally Harmonised System of Classification and Labelling of Chemicals (GHS), 3rd revised edition. United Nations Economic Commission for Europe (UN/ECE), <http://www.unece.org/trans/danger/publi/ghs/ghs_rev03/03files_e.html >.

US EPA (2011) Estimation Programs Interface (EPI) Suite™ for Microsoft® Windows, v4.10. United States Environmental Protection Agency. Washington DC, USA