File No: LTD/1563

March 2012

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

PUBLIC REPORT

Quincester

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 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:

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Director
NICNAS

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SUMMARY

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

ASSESSMENT REFERENCE	APPLICANT(S)	CHEMICAL OR TRADE NAME	HAZARDOUS SUBSTANCE	INTRODUCTION VOLUME	USE
LTD/1563	Firmenich Limited	Quincester	Yes	<1 tonne per annum	Component of cosmetic and household cleaning products

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:

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. The environmental classification under this system is not mandated in Australia and carries no legal status but is presented for information purposes.

	Hazard category	*Hazard statement*
Skin Corrosion/Irritation	Category 2	Causes skin irritation
Skin Sensitisation	Category 1	May cause an allergic skin reaction
Aquatic Environment	Acute Category 1 Chronic Category 2	Very toxic to aquatic life Toxic 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 unreasonable risk to the health of workers.

When used in the proposed manner, 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, the maximum annual importation volume and assessed use pattern, the notified chemical is not expected to pose an unreasonable 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:
  - Xi: R43 May cause sensitisation by skin contact
  - Xi: R38 Irritating to skin

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

- The Delegate (and/or the Advisory Committee on Chemicals Scheduling) should consider the notified chemical for listing on the SUSMP.

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 isolation and engineering controls to minimise occupational exposure to the notified chemical during reformulation processes:
  - Enclosed, automated processes, where possible

- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified chemical during reformulation processes:
  - 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 during reformulation processes:
  - Coveralls, impervious 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/polymer 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 chemical exceeds or is intended to exceed 0.06% in fine fragrances, 0.1% in other cosmetic products and 1% in household cleaning products.

or

(2) Under Section 64(2) of the Act; if
- the function or use of the chemical has changed from a component of cosmetic and household cleaning products, 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 the notified chemical provided by the notifier was reviewed by NICNAS. The accuracy of the information on the MSDS remains the responsibility of the applicant.

ASSESSMENT DETAILS

This notification has been conducted under the cooperative arrangement with the United States Environmental Protection Agency (US EPA). Information pertaining to the assessment of the notified chemical by the US EPA was provided to NICNAS and, where appropriate, used in this assessment report. The other elements of the risk assessment, including the recommendations on safe use of the notified chemical, were carried out by NICNAS.

1. APPLICANT AND NOTIFICATION DETAILS

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)
Variation to the schedule of data requirements is claimed as follows: vapour pressure, adsorption/desorption, flammability and autoignition temperature.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
Low Volume Chemical (LVC) permit

NOTIFICATION IN OTHER COUNTRIES
USA (1997), Philippines (2000), Canada (2004), Switzerland (2006), Japan (2009)

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
Quincester

MOLECULAR WEIGHT
<500 Da

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

3. COMPOSITION

DEGREE OF PURITY >90%

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 ºC AND 101.3 kPa: colourless liquid

Property	Value	Data Source/Justification
Melting Point/Freezing Point	<-22ºC	Measured
Boiling Point	Decomposition at ~275 ºC at 101.5 kPa, prior to boiling	Measured
Density	923-929 kg/m^3 at 20 ºC	MSDS
Vapour Pressure	9.35 x 10^{-4} kPa at 25 ºC	Estimated - mean VP of Antoine & Grain methods (US EPA, 2009)
Water Solubility	6.38 × 10^{-3} g/L at 20 ºC	Measured
Hydrolysis as a Function of pH	≥60% after 28 days (40 ºC, pH 2-12)	Measured
Partition Coefficient (n-octanol/water)	log Pow = 4.12-4.51	Measured
Adsorption/Desorption	log K_{oc} = 3.14-3.35	Calculated (KOCWIN v2.00, from log Kow, US EPA, 2009). Expected to have low to slight mobility in soil.
Dissociation Constant	Not determined	Contains no dissociable functionality
Flash Point	121 ± 2 ºC at 101.3 kPa (closed cup)	Measured. Classified as a C1 combustible liquid (NOHSC, 2001).
Flammability	Not determined	Based on the flash point, not classified as flammable (NTC, 2007)
Autoignition Temperature	>121 ºC based on flash point	Not expected to autoignite under normal conditions
Explosive Properties	Predicted negative	Contains no functional groups that would imply explosive properties.
Oxidising Properties	Predicted negative	Contains no functional groups that would imply oxidative properties.

DISCUSSION OF PROPERTIES
For full details of tests on physical and chemical properties not assessed by the US EPA, 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 (≤6%) 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

IDENTITY OF MANUFACTURER/RECIPIENTS
Firmenich Ltd

TRANSPORTATION AND PACKAGING
The fragrance preparations containing the notified chemical (at ≤6% 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 is intended to be used as a component of fragrances for a variety of cosmetic and household cleaning products (proposed usage concentration: ≤0.06% concentration in fine fragrances, ≤0.1% in other cosmetic products and ≤1% in household cleaning products).

OPERATION DESCRIPTION
The procedures for incorporating the imported preparations (containing ≤6% notified chemical) into end-use products will likely vary depending on the nature of the cosmetic and personal care/household cleaning 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 end-use products into containers of various sizes.

The end-use products containing the notified chemical may be used by consumers and professionals such as hairdressers, workers in beauty salons or cleaners. 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

CATEGORY OF WORKERS

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

EXPOSURE DETAILS
Transport and storage workers may come into contact with the notified chemical, as a component of the imported preparations or end-use products (≤6%), only in the event of accidental rupture of containers.

During reformulation, dermal, ocular and perhaps inhalation exposure of workers to the notified chemical (at ≤6% concentration) 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 coveralls, safety glasses and impervious gloves.

Exposure to the notified chemical in end-use products (at ≤1% concentration) may occur in professions where the services provided involve the application of cosmetic and personal care products to clients (e.g. hairdressers, workers in beauty salons) or in the cleaning industry. 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 (at ≤1% concentration) through the use of the household cleaning products and 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.

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 >2,000 mg/kg bw; low toxicity
Rabbit, skin irritation	irritating
Rabbit, eye irritation	slightly irritating
Guinea pig, skin sensitisation – adjuvant test	evidence of sensitisation
Human, skin sensitisation – RIPT (5%)	no evidence of sensitisation
Mutagenicity – bacterial reverse mutation	non mutagenic

Toxicokinetics, metabolism and distribution.

Based on the water solubility (6.38×10^{-3} g/L at 20 ºC), partition coefficient (log P_{ow} = 4.12-4.51) and the low molecular weight (<500 Da) of the notified chemical, passive diffusion across the gastrointestinal (GI) tract and dermal absorption are expected to occur. The notified chemical may also be absorbed across the respiratory tract.

Acute toxicity.

The notified chemical was found to be of low acute oral toxicity in rats. Acute dermal and inhalation toxicity data were not 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 to slight oedema noted. Desquamation was noted up to and including the final day of observation.

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 (at 50% induction concentration; 25% challenge concentration) was found to be a sensitiser in guinea pigs (Magnus-Kligman method), with discrete/patchy to moderate/confluent erythema noted in 9/19 and 3/19 animals at 24 and 48 hours after patch removal, respectively. At rechallenge (5% notified chemical), discrete/patchy erythema was noted in 3/19 and 1/19 animals at 24 and 48 hours after patch removal, respectively, and at rechallenge with 1% notified chemical, no skin reactions were noted. The notified chemical (at 5% concentration) was not a skin sensitiser in a human repeat insult patch study.

Repeated Dose Toxicity.

No repeated dose toxicity data were provided for the notified chemical. However, several repeat dose toxicity studies conducted with an analogue of an expected major metabolite of the notified chemical (at ≤10% concentration) have been reported, with no notable effects.

Mutagenicity.

The notified chemical was not mutagenic in a bacterial reverse mutation study.

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:

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 ≤6% concentration as imported, and at ≤1% in end-use products. While the notified chemical was found to be irritating to the skin, irritant effects are not expected at the proposed introduction and usage concentrations. 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

Cleaners and beauty care professionals will handle the notified chemical at ≤1% concentration, similar to public use. Therefore, the risk to workers 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. For details of the public health risk assessment see section 6.3.2.

Based on the information available, the risk to workers associated with the use of the notified chemical at ≤0.06% concentration in fine fragrances, ≤0.1% in other cosmetic products and ≤1% in household cleaning products, is not considered to be unreasonable.

6.3.2. Public Health

Repeat dose toxicity data are not available for the notified chemical. However, based on studies conducted on an analogue of an expected major metabolite of the notified chemical, systemic toxicity is not expected. The main risk associated with use of the notified chemical at ≤0.06% concentration in fine fragrances, ≤0.1% in other cosmetic products and ≤1% in household cleaning products, is its potential to cause sensitisation by skin contact.

Methods for the quantitative risk assessment for dermal sensitisation have been proposed and been the subject of significant discussion (see for example, Api *et al.*, 2008 and RIVM, 2010). Using face cream (containing 0.1% notified chemical) as an example product that may contain the notified chemical, as a worst case scenario, the Consumer Exposure Level (CEL) is estimated to be 2.73 μg/cm^2 (SCCS, 2010). When tested at 5% concentration in a human repeat insult patch study (0.2 mL applied to a 2 cm x 2 cm patch), the notified chemical was not a skin sensitiser. Consideration of the study details and application of appropriate safety factors allowed the derivation of an Acceptable Exposure Level (AEL) of 8.3 μg/cm^2. In this instance, the factors employed included an intraspecies factor (10), a matrix factor (3.16), a use and time factor (3.16) and a database uncertainty factor (3.16), giving an overall safety factor of >300 (300 used for calculations).

As the AEL>CEL, the risk to the public of the induction of sensitisation that is associated with the use of face cream (a worst case example of a leave-on cosmetic product) at ≤0.1% concentration is not considered to be unreasonable. Based on the significantly lower expected exposure level for rinse-off products (containing ≤0.1% notified chemical) and household cleaning products (≤1% notified chemical), by inference, the risk of induction of sensitisation associated with the use of these products is also not considered to be unreasonable. It is acknowledged that consumers may be exposed to multiple products containing the notified chemical, and a quantitative assessment based on the aggregate exposure has not been conducted. Based on the information available, the risk to the public associated with the use of the notified chemical at ≤0.06% concentration in fine fragrances, ≤0.1% in other cosmetic products and ≤1% in household cleaning products, is not considered to be unreasonable.

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). Release during reformulation in Australia is expected to arise from spills (0.1%), formulation equipment cleaning (no release estimate as cleaning water is recycled) and residues in import containers (0.1%). Accidental spills during transport or reformulation are expected to be collected with inert material and disposed of to landfill. Import containers will either be recycled or disposed of through an approved waste management facility. Therefore, up to 0.2% of the import volume is estimated to be released to landfill as a result of reformulation in Australia.

RELEASE OF CHEMICAL FROM USE
The notified chemical is expected to be released to sewers in domestic situations across Australia as a result of its use in cosmetic and household cleaning products, which are either washed off the hair and skin of consumers, or disposed of following cleaning activities.

RELEASE OF CHEMICAL FROM DISPOSAL
It is estimated that a maximum of 3% of the consumer products containing the notified chemical will remain in end-use containers. These are likely to be disposed of through domestic garbage disposal and enter landfill or be recycled.

7.1.2. Environmental Fate
Following its use in Australia, the majority of the notified chemical is expected to enter the sewer system. An estimated 75% of the notified chemical is predicted to be removed during sewage treatment plant (STP) processes (assuming a worst case log Pow = 4.12, SimpleTreat; European Commission, 2003), with 53% removal by degradation, 5% by volatilisation and a further 17% removed through partitioning to sludge, before discharge to surface waters on a nationwide basis. The provided study indicates that significant hydrolysis occurs at elevated temperatures in the environmental pH range, although estimated data indicates that hydrolysis may not be significant under environmental conditions with $t_{½}$ = 2.5 years at pH 8 and 25 ºC and $t_{½}$ = 25 years at pH 7 and 25 ºC (HYDROWIN v2.00, US EPA, 2009). The notified chemical is not readily biodegradable under the conditions of OECD TG 301F as it failed to meet the 10 day window criterion but reached the pass level after 28 days (see Appendix C) and is thus considered rapidly degradable (GHS, 2009). Although the notified chemical has a high partition coefficient the notified chemical is not likely to bioaccumulate, based on its predicted low bioconcentration factor (log BCF = 2.39-2.64, BCFBAF v3.01, US EPA, 2009). In the case of release to surface waters, the notified chemical is expected to disperse and degrade through biotic and abiotic processes to form water and oxides of carbon.

The notified chemical is moderately volatile (log H = 1.454 Pa/m^3/mol, SimpleTreat, European Commission, 2003) and may volatilise to air during use or sewage treatment. The half-life of the notified chemical in air is calculated to be ≤1.2 h and 1.5 h, based on reactions with hydroxyl radicals and ozone respectively (AOPWIN, v1.29, US EPA, 2009). Therefore, in the event of release to atmosphere, the notified chemical is not expected to persist in the air compartment.

A proportion of notified chemical may be applied to land when treated sewage effluent is used for irrigation or when sewage sludge is used for soil remediation, or disposed of to landfill. Notified chemical residues in landfill, soil and sludge are expected to have low to slight mobility based on its predicted soil adsorption coefficient (log Koc = 3.14-3.35), and are expected to degrade to form water and oxides of carbon.

7.1.3. Predicted Environmental Concentration (PEC)
The following Predicted Environmental Concentrations (PEC) have been calculated assuming that all of the imported quantity of notified chemical will be released to sewer. Of this, an estimated 75% is predicted to be removed during sewage treatment plant (STP) processes (SimpleTreat, European Commission, 2003) before discharge to surface waters on a nationwide basis.

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	L/person/day
Population of Australia (Millions)	22.613	million

Removal within STP	75%	
Daily effluent production:	4,523	ML
Dilution Factor - River	1	
Dilution Factor - Ocean	10	
PEC - River:	0.15	µg/L
PEC - Ocean:	0.02	µg/L

Partitioning to biosolids in STPs Australia-wide may result in an average biosolids concentration of 1.03 mg/kg (dry wt). Biosolids are applied to agricultural soils, with an assumed average rate of 10 t/ha/year. Assuming a soil bulk density of 1500 kg/m^3 and a soil-mixing zone of 10 cm, the concentration of the notified chemical may approximate 0.007 mg/kg in applied soil. This assumes that degradation of the notified chemical occurs in the soil within 1 year from application. Assuming accumulation of the notified chemical in soil for 5 and 10 years under repeated biosolids application, the concentration of notified chemical in the applied soil in 5 and 10 years may approximate 0.035 mg/kg and 0.07 mg/kg, respectively.

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 0.151 µg/L may potentially result in a soil concentration of approximately 1.010 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 5.048 µg/kg and 10.10 µg/kg, respectively.

7.2. Environmental Effects Assessment

No ecotoxicity data were submitted. Estimated effects endpoints for aquatic organisms were calculated and are included in the table below.

Endpoint	*Result*	*Assessment Conclusion*
Acute Toxicity		
Fish Toxicity	96 h LC50 = 0.836 mg/L[1]	Very toxic to fish
Daphnia Toxicity	48 h LC50 = 1.50 mg/L[1]	Toxic to aquatic invertebrates
Algal Toxicity	96 h EC50 = 0.964 mg/L[1]	Very toxic to algae
Chronic Toxicity		
Fish Toxicity	ChV = 0.012 mg/L[1]	Toxic to fish with long lasting effects
Daphnia Toxicity	ChV = 0.031 mg/L[1]	Toxic to aquatic invertebrates with long lasting effects
Algal Toxicity	ChV = 0.165 mg/L[1]	Harmful to algae with long lasting effects

[1] Modelled estimates (ECOSAR v1.00, class – acrylates, KOWWIN calculated log Kow = 4.15, US EPA, 2009).

Based on the estimated endpoints in the absence of experimental data, under the Globally Harmonised System of Classification and Labelling of Chemicals (GHS; United Nations, 2009) the notified chemical is very toxic to fish and algae, and toxic to aquatic invertebrates, and is formally classified as 'Acute Category 1: Very toxic to aquatic life'.

The GHS classification for long-term hazard are based on NOEC (or equivalent EC*x*) endpoints, whereas the available endpoints are chronic values [ChV = (LOEC × NOEC)^{½}] which, by definition, are greater than the NOEC. On the basis of its rapid degradability and the estimated ChV endpoints the notified chemical is, at best, toxic with long lasting effects to fish and aquatic invertebrates and harmful to algae with long lasting effects. In the absence of experimental data, the long-term hazard of the notified chemical is formally classified under the GHS on the basis of its estimated chronic toxicity to aquatic biota, and its rapid degradability, as 'Chronic Category 2: Toxic to aquatic life with long lasting effects'.

7.2.1. Predicted No-Effect Concentration

The predicted no-effect concentration (PNEC) has been calculated from the estimated chronic fish toxicity of the notified chemical and an assessment factor of 50. A more conservative assessment factor of 50 is appropriate in this case as although chronic endpoints (ChV = (LOEC × NOEC)^{½}) for three trophic levels are available, these chronic endpoints are not no-observed effect concentrations (NOECs).

Predicted No-Effect Concentration (PNEC) for the Aquatic Compartment

ChV (Fish)	0.01	mg/L
Assessment Factor	50	
PNEC:	0.24	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:	0.15	0.24	0.631
Q - Ocean:	0.02	0.24	0.063

The risk quotient for discharge of treated effluents containing the notified chemical to riverine environments indicates a narrow safety margin as a result of the estimated chronic toxicity of this chemical. However, the notified chemical is unlikely to reach ecotoxicologically significant concentrations in riverine environments based on its annual import quantity and the partial removal of the chemical from waste water by degradation, sorption to sewage sludge and partitioning into air. The notified chemical has a low potential for bioaccumulation and is unlikely to persist in surface waters, air or soils. Therefore, on the basis of the PEC/PNEC ratio, maximum annual import volume and assessed use pattern in cosmetic and household cleaning 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 <-22 ºC

Method OECD TG 102 Melting Point/Melting Range.
EC Directive 92/69/EEC A.1 Melting/Freezing Temperature.
Remarks Determined by placing a test tube containing the test substance in a dry ice/acetone bath until the temperature of the substance reached ~-22 ºC. The test substance did not show any indication of freezing.
Test Facility Safepharm (1996a)

Boiling Point Decomposition from ~275 ºC at 101.5 kPa

Method OECD TG 103 Boiling Point.
EC Directive 92/69/EEC A.2 Boiling Temperature.
Remarks Determined using distillation method. The test substance decomposed prior to boiling.
Test Facility Safepharm (1996a)

Water Solubility 6.38×10^{-3} g/L at 20 ºC

Method OECD TG 105 Water Solubility.
EC Directive 92/69/EEC A.6 Water Solubility.
Remarks Flask Method.
Test Facility Safepharm (1996a)

Hydrolysis as a Function of pH ≥60% after 28 days at 40 ºC at pH 2-12

Method In-house

pH	*% hydrolysis after 7 days at 40 ºC**	*% hydrolysis after 28 days at 40 ºC**
2	~30	~75
5	~50	~90
7	<5	~60
8.5	~40	~70
12	100	100

* Data points are approximated based on the provided graph

Remarks 0.001 M notified chemical in buffer solutions (types A, C, D, F and I: Reference Handbook of Chemistry and Physics) with 1% non-ionic surfactant. GC-FID determination at day 1, 2, 4, 7, 15, 21 and 28.

The rate of hydrolysis was slowest under neutral conditions (pH 7) and increased under acidic and basic conditions. Hydrolysis was approximately 60% or more after 28 days at 40 ºC across the tested pH range (2-12), indicating the notified chemical is expected to hydrolyse under environmental conditions.
Test Facility Firmenich (2011)

Flash Point 121 ± 2 ºC at 101.3 kPa

Method EC Directive 92/69/EEC A.9 Flash Point.
Remarks Determined using a closed cup equilibrium method.
Test Facility Safepharm (1996b)

APPENDIX B: TOXICOLOGICAL INVESTIGATIONS

B.1. Acute toxicity – oral

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 401 Acute Oral Toxicity – Limit Test.
Species/Strain	Rat/Sprague-Dawley CD, 5M/5F
Vehicle	None
Remarks - Method	No significant protocol deviations
RESULTS	
Remarks - Results	There were no mortalities observed
LD50	>2,000 mg/kg bw
Signs of Toxicity	None
Effects in Organs	None
CONCLUSION	The notified chemical is of low toxicity via the oral route.
TEST FACILITY	Safepharm (1996c)

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
Vehicle	None
Observation Period	14 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	2	1.3	2	2	<14 days	0
Oedema	1.3	0.7	1.7	2	<14 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 to slight oedema were noted at up to the day 7 observation. These effects were resolved by the day 14 observation. Crust formation preventing an accurate erythema reading was noted at a single treated site at the day 7 observation. Moderate desquamation was noted at the treated site of 2 animals at day 7 and slight desquamation was noted at the sites of all animals at the end of the observation period.
CONCLUSION	The notified chemical is irritating to the skin.
TEST FACILITY	Safepharm (1996d)

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
Observation Period	72 hours
Remarks - Method	One drop of the local anaesthetic (proxymetacaine hydrochloride, 0.5%) was instilled into both eyes of the second and third animals 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	3			
Conjunctiva: redness	0.7	0.3	0.3	2	<72 hrs	0
Conjunctiva: chemosis	0.3	0	0	1	<48 hrs	0
Corneal opacity	0	0	0	0	-	0
Iridial inflammation	0	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 hour post instillation with minimal irritation noted after 24- and 48-hours. The treated eyes were normal after 72 hours.

CONCLUSION The notified chemical is slightly irritating to the eye.

TEST FACILITY Safepharm (1996e)

B.4. Skin sensitisation

TEST SUBSTANCE Notified chemical

METHOD Similar to OECD TG 406 Skin Sensitisation - Magnusson and Kligman guinea pig maximisation test.

Species/Strain	Guinea pig/Dunkin Hartley
PRELIMINARY STUDY	Maximum Non-irritating Concentration: intradermal: 25% topical: 25%
MAIN STUDY	
Number of Animals	Test Group: 20F Control Group: 10F
INDUCTION PHASE	Induction Concentration: intradermal: 25% topical: 50%
Signs of Irritation	Following the intradermal and topical induction phases, minimal irritation at the induction sites was noted.
CHALLENGE PHASE	
1st challenge	topical: 25%
2nd challenge	topical: 5% and 1%
Remarks - Method	The vehicle was diethyl phthalate. During the topical induction stage, the patches were inadvertently removed from 5 animals 24-hours prematurely. However, these were replaced with new patches within 3-hours of removal. As the results of the first challenge indicated that the test substance was a sensitiser, the animals were rechallenged (at 5% and 1%) to determine a concentration of the test substance which produced no apparent effect.

RESULTS

Animal	*Challenge Concentration*	*Number of Animals Showing Skin Reactions after:*

		1st challenge		*2nd challenge*	
		24 h	*48 h*	*24 h*	*48 h*
Test Group	25%	9/19	3/19	-	-
	5%	-	-	3/19	1/19
	1%	-	-	0/19	0/19
Control Group	25/5/1%	0/10	0/10	0/10	0/10

Remarks - Results

A single animal in the test group was found dead in its cage on day 20 of the study (a cannibalised carcase with moderate autolysis was noted at post-mortem).

Discrete/patchy erythema-moderate/confluent erythema was noted in 9/19 and 3/19 animals at 24 and 48 hours after patch removal, respectively. At rechallenge with 5% test substance, Discrete/patchy erythema was noted in 3/19 and 1/19 animals at 24 and 48 hours after patch removal, respectively. At rechallenge with 1% test substance, no positive reactions to the test substance were noted.

CONCLUSION

There was evidence of reactions indicative of skin sensitisation to the notified chemical under the conditions of the test.

TEST FACILITY

Toxicol (2005)

B.5. Skin sensitisation – human volunteers

TEST SUBSTANCE

Notified chemical (5% in vehicle)

METHOD

Repeated insult patch test with challenge

Study Design

Induction Procedure: Patches containing 0.2 mL test substance were applied 3 times per week (Monday, Wednesday and Friday) for a total of 9 applications. Patches were removed by the applicants after 24 h and graded after an additional 24 h (or 48 h for patches applied on Friday).
Rest Period: 10-15 days
Challenge Procedure: A patch was applied to a naïve site. Patches were removed by the applicants after 24 h. Sites were graded 24 and 48 h post-patch removal.

Study Group

92 F, 12 M; age range 18-74 years

Vehicle

Diethyl phthalate

Remarks - Method

Occluded. The test substance was spread on a 2 cm x 2 cm patch.
The test substance was one of two substances tested.

RESULTS

Remarks - Results

101/104 subjects completed the study. One subject was discontinued for failure to keep to the scheduled visits (3 induction observations recorded) and two voluntarily withdrew (following the first and second induction readings).

A minimal or doubtful response was noted for 1, 1, 2, 4 and 2 subjects at induction observations 2, 6, 7, 8 and 9, respectively. No adverse responses were noted at challenge.

CONCLUSION

The test substance was non-sensitising under the conditions of the test.

TEST FACILITY

TKL (1996)

B.6. Genotoxicity – bacteria

TEST SUBSTANCE

Notified chemical

METHOD	OECD TG 471 Bacterial Reverse Mutation Test. Plate incorporation procedure
Species/Strain	*S. typhimurium*: TA1538, TA1535, TA1537, TA98, TA100
Metabolic Activation System	Aroclor 1254-induced rat liver (S9 homogenate)
Concentration Range in Main Test	a) With metabolic activation: 0, 15, 50, 150, 500, 1500, 5000 µg/plate b) Without metabolic activation: 0, 5, 15, 50, 150, 500, 1500, 5000 µg/plate
Vehicle	Acetone
Remarks - Method	A preliminary toxicity test (0-5000 µg/plate) was performed to determine the toxicity of the test material (TA100 only). The first study (Test 1) was conducted using concentrations 1.5-5000 µg/plate (without S9; TA98 only at 1500 and 5000 µg/plate) and 5-5000 µg/plate (with S9; TA98 and TA1538 only at 5000 µg/plate) of the test substance, assayed in triplicate against each tester strain. The second study (Test 2) was conducted using concentrations 5-5000 µg/plate (without S9; TA98 only at 5000 µg/plate) and 15-5000 µg/plate (with S9) of the test substance, assayed in triplicate against each tester strain, 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), 4-nitro-o-phenylenediamine (TA1538), 9-aminoacridine (TA1537) and 4-nitroquinoline-1-oxide (TA98); ii) with S9: 2-aminoanthracene.

RESULTS

Metabolic Activation	*Test Substance Concentration (µg/plate) Resulting in:*			
	Cytotoxicity in Preliminary Test	*Cytotoxicity in Main Test*	*Precipitation*	*Genotoxic Effect*
Absent				
Test 1	≥150	≥500	-	Negative
Test 2		≥500	-	Negative
Present				
Test 1	≥500	≥1500	-	Negative
Test 2		≥1500	-	Negative

Remarks - Results	In the preliminary toxicity study, the test material was toxic to the TA100 strain at ≥150 µg/plate without metabolic activation and at ≥500 µg/plate with metabolic activation. In the mutation studies, the test substance caused a visible reduction in the growth of the bacterial background lawn to all strains, from 1500 and 500 µg/plate, with and without metabolic activation, respectively. 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	Safepharm (1996f)

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. EC Directive 92/69/EC C.4-D Biodegradation: Determination of the "Ready" Biodegradability: Manometric Respirometry Test
Inoculum	Activated sewage sludge, domestic
Exposure Period	28 days
Auxiliary Solvent	None
Analytical Monitoring	BOD
Remarks - Method	The test was conducted in accordance with the guideline above and in compliance with GLP standards and principles. There were no significant deviations from the protocol. ThOD was calculated to be 245 mg O_2/100 mg of notified chemical.

RESULTS

Day	*Notified chemical (100 mg/L)* *% Degradation*	*Notified chemical plus aniline (100 mg/L, toxicity control)* *% Degradation*	*Aniline (100 mg/L, reference substance)* *% Degradation*
3	16	-	-
7	38	-	-
13	58	-	-
14	59	69	78
28	83	-	-

Remarks - Results	The validity criteria were achieved after 14 days for the reference substance and toxicity controls as degradation exceeded the pass level of 60% (ThOD), and oxygen consumption was below 60 mg/L after 28 days for the inoculum blank. The maximum biodegradation of the notified chemical during the test was 83% at day 28, which is greater than the pass level of 60% (ThOD). However, the 10-day window once the degree of degradation has reached 10% was not met. Therefore, the notified chemical is not considered readily biodegradable. However, it may be considered inherently biodegradable on the basis of the test results.
CONCLUSION	The notified chemical is inherently biodegradable.
TEST FACILITY	Safepharm (1996g)

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