File No: LTD/1786

October 2014

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)**

# PUBLIC REPORT

## Corps Cereales

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/1786 | Firmenich Limited | Corps Cereales | 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* |
|---|---|
| Acute toxicity (Category 4) | H302 – Harmful if swallowed |
| Skin sensitisation (Category 1) | H317 – May cause an allergic skin reaction |

Based on the available information, the notified chemical is recommended for hazard classification according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004) with the following risk phrases:
R22 Harmful if swallowed
R43 May cause sensitisation by skin contact

**Human health risk assessment**
Provided that control measures are in place to minimise worker exposure, the notified chemical is not considered to pose an unreasonable risk to the health of workers.

When used at ≤ 0.0026% in deodorants, ≤ 0.0049% in fine fragrances, ≤ 0.01% in body lotion, ≤ 0.0067% in other leave-on cosmetic products and ≤ 0.01% in other rinse-off cosmetic 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 reported 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:
  - Acute toxicity (Category 4): H302 – Harmful if swallowed
  - Skin sensitisation (Category 1): H317 – May cause an allergic skin reaction

  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.

- 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 skin sensitisation.

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 processes:
  - Enclosed, automated processes, where possible
  - Ventilation system, including local exhaust ventilation

- 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 reformulation processes:
  - Avoid contact with skin and eyes
  - Avoid inhalation

- 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 processes:
  - Impervious gloves, eye protection and coveralls
  - Respiratory protection, if 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.

Public Health

- The following following measures should be taken to minimise public exposure to the notified chemical:
  - The notified chemical should only be used at ≤ 0.0026% in deodorants, ≤ 0.0049% in fine fragrances, ≤ 0.01% in body lotion, ≤ 0.0067% in other leave-on cosmetic products and ≤ 0.01% in rinse-off cosmetic 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

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 exceed 0.0026% in deodorants, 0.0049% in fine fragrances, 0.01% in body lotion, 0.0067% in other leave-on cosmetic products and 0.01% in rinse-off cosmetic and household products;
- information becomes available on the repeated dose toxicity potential 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
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: water solubility, partition coefficient, adsorption/desorption, dissociation constant, flammability limits, explosive and oxidising properties.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None.

NOTIFICATION IN OTHER COUNTRIES
USA (2004), EU (2004), Switzerland (2006), Philippines (2005)

## 2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
Corps Cereales

MOLECULAR WEIGHT
< 500 Da

ANALYTICAL DATA
Reference NMR, IR, 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 to orange liquid.

| Property | Value | Data Source/Justification |
|---|---|---|
| Melting Point/Freezing Point | < -20 ± 0.5 °C | Measured |
| Boiling Point | 230.0 ± 0.5 °C at 97.8 kPa | Measured |
| Density | 1157 kg/m$^3$ at 20.0 ± 0.5 °C | Measured |
| Vapour Pressure | 1.21 x 10$^{-2}$ kPa at 25.0 °C | Measured |
| Water Solubility | 345 g/L at 20 °C | Calculated. WSKOW v1.42, EPI Suite v4.1 (US EPA, 2010). |
| Hydrolysis as a Function of pH | $t_{½} \leq$ 3.3 days at 25 °C and pH 2 – 12 | Measured |
| Partition Coefficient (n-octanol/water) | log Pow = 1.75 | Calculated. KOWIN v1.68, EPI Suite v4.1 (US EPA, 2010) |
| Adsorption/Desorption | log $K_{oc}$ = 1.82 (MCI method)<br>log $K_{oc}$ = 1.75 (Kow method) | Calculated. KOCWIN v2.0, EPI Suite v4.1 (US EPA, 2010). |

| | | |
|---|---|---|
| Dissociation Constant | Not determined | Contains dissociable functionality. Therefore, the notified chemical has potential to dissociate under normal environmental conditions (pH 4 – 9). |
| Flash Point | 115.0 ± 2.0 °C at 101.3 kPa | Measured |
| Autoignition Temperature | 225.0 °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 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.

***Physical hazard classification***
Based on the submitted physico-chemical data depicted in the above table, the notified chemical is not 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.

## 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 at 100% concentration, as well as a component of compounded fragrance formulations (at concentrations ≤ 0.5%) and various formulated end-use cosmetic and household products (at proposed usage concentrations of ≤ 0.01%).

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 Limited

TRANSPORTATION AND PACKAGING
The notified chemical (at ≤ 100% concentration) will be imported into Australia in lacquered drums of sizes ranging from 5 kg up to 180 kg. The end-use products (at proposed usage concentration of ≤ 0.01% notified chemical) will be packaged in typical consumer-sized containers suitable for retail sale.

The notified chemical will be transported from the port of entry by road to the notifier's warehouse facilities for storage in its original packaging until transportation to the customer site. Alternatively, the notified chemical and products containing it will be shipped directly from the port of entry to the customer site.

USE
The notified chemical will be used as a fragrance ingredient and incorporated into a variety of cosmetic and household products (at proposed usage concentration of ≤ 0.01%).

OPERATION DESCRIPTION
No manufacturing, processing, reformulating or repackaging of the notified chemical will occur at the notifier's facility. The imported products containing the notified chemical will be stored at this facility until they are transported to customer facilities (in original importation packaging).

At the customer facilities, the procedures for incorporating the imported fragrance preparations (containing ≤ 100% notified chemical) into end-use products will likely vary depending on the nature of the cosmetic and household 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 into containers of various sizes.

*Household products*
Household products containing the notified chemical (≤ 0.01% 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, using a cloth, sponge, mop or brush and followed by wiping. In some cases the household product will be diluted with water prior to application.

*Cosmetics*
The finished cosmetic products containing the notified chemical at ≤ 0.01% 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 and warehouse workers | unknown | unknown |
| Mixer | 4 | 2 |
| Drum Handling | 4 | 2 |
| Drum Cleaning/washing | 4 | 2 |
| Maintenance | 4 | 2 |
| Quality Control worker | 0.5 | 1 |
| Packager | 4 | 2 |
| End users (professionals) | unspecified | unspecified |

EXPOSURE DETAILS
*Transport and storage*
Transport and storage workers may come into contact with the notified chemical, at 100% concentration or as a component of the imported fragrance preparations (≤ 0.5% concentration) or end-use products (≤ 0.01% proposed usage concentration), only in the event of accidental rupture of containers.

At the notifier facility, the primary work activity undertaken by transport and warehouse workers will include the handling, loading and off-loading of drums containing the notified chemical at ≤ 100% concentration. Exposures of these workers will be limited to situations of an accidental discharge, spill or leaking drum, requiring clean up. If such an event occurs, a worker may be exposed through dermal or ocular contact. The notifier states that such exposures will be minimised through the use of personal protective equipment (PPE) including protective clothing, chemical resistant gloves and eye protection.

*Formulation of end products*
During reformulation, dermal, ocular and perhaps inhalation exposure of workers to the notified chemical (at ≤ 100% concentration) may occur during weighing and transfer stages, blending, quality control analysis and cleaning and maintenance of equipment. The notifier states that exposure is expected to be minimised through the use of mechanical ventilation and/or enclosed systems, and through the use of PPE such as protective clothing, eye protection, impervious gloves and respiratory protection (if appropriate).

*Beauty care and cleaning professionals*

Exposure to the notified chemical (at proposed usage concentration of ≤ 0.01%) in end-use products may occur in professions where the services provided involve the application of cosmetic products to clients (e.g. hair dressers, 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 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 household products and the leave-on and rinse-off cosmetics (at proposed usage concentration of ≤ 0.01% in individual 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 following table. For full details of the studies, refer to Appendix B.

| *Endpoint* | *Result and Assessment Conclusion* |
|---|---|
| Rat, acute oral toxicity | LD50 ~ 300 - 500 mg/kg bw (300 – 2,000 mg/kg bw); harmful |
| Guinea pig, skin sensitisation – Buehler non-adjuvant test. | evidence of sensitisation |
| Human, skin sensitisation – RIPT (0.1 %) | no evidence of sensitisation |

*Toxicokinetics, metabolism and distribution.*
No toxicokinetic data was provided on the notified chemical. Based on the expected water solubility (calculated; 345 g/L at 20 °C), partition coefficient (calculated; log $K_{ow}$ = 1.75) and the low molecular weight (< 500 Da) of the notified chemical, passive diffusion across the gastrointestinal (GI) tract is possible. Dermal and respiratory absorption of the notified chemical may also occur.

*Acute toxicity.*
The notified chemical was found to be harmful via the oral route in a study conducted in rats, with the study authors estimating the LD50 to be in the range of 300 - 500 mg/kg bw. Clinical signs were seen in animals at both 300 and 2,000 mg/kg bw. These included hunched posture, lethargy, ataxia, decreased respiratory rate and laboured respiration. 2,000 mg/kg group animals also showed increased lacrimation and splayed gait. The animals treated at 300 mg/kg bw recovered within 1 day of dosing. The 2,000 mg/kg bw group animals continued to show signs on the day following dosing and were found dead on day 2. At necropsy, abnormalities were noted in the 2,000 mg/kg bw group animals, including dark or patchy pallor of the liver, haemorrhagic lungs, dark kidneys, haemorrhage of the gastric mucosa and haemorrhage of the small intestine. No abnormalities were noted at necropsy in the animals dosed at 300 mg/kg bw.

No acute dermal or inhalation toxicity data were provided for the notified chemical.

*Irritation and sensitisation.*
No ocular or dermal irritation data were provided for the notified chemical. However, based on the highly functionalised structure of the notified chemical, exposure to the notified chemical may result in skin and/or eye irritation effects.

A Buehler test was conducted to determine the skin sensitisation potential of the notified chemical in guinea pigs (100% induction concentration; 75% challenge concentration). The notified chemical was considered to be a skin sensitiser under the conditions of the test, with responses noted in 18/20 animals at challenge.

In a human repeat insult patch test (HRIPT) completed on 101 subjects, the notified chemical (at 0.1% concentration) did not induce skin sensitisation.

*Repeated dose toxicity.*
No repeated dose toxicity data were provided for the notified chemical.

*Mutagenicity/Genotoxicity.*
No mutagenicity or genotoxicity data were provided for the notified chemical.

***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* |
|---|---|
| Acute toxicity (Category 4) | H302 – Harmful if swallowed |
| Skin sensitisation (Category 1) | H317 – May cause an allergic skin reaction |

Based on the available information, the notified chemical is recommended for hazard classification according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004), with the following risk phrase(s):

R22: Harmful if swallowed
R43: May cause sensitisation by skin contact

### 6.3. Human Health Risk Characterisation

#### 6.3.1. Occupational Health and Safety

*Reformulation*
Workers may experience dermal, ocular and perhaps inhalation exposure to the notified chemical (at ≤ 100% concentration) during reformulation processes. Limited information is available on the health hazards of the notified chemical. While the notified chemical is considered to be harmful to human health via the oral route, ingestion is unlikely under the occupational settings described. The notified chemical is considered to be a skin sensitiser and, based on structural considerations, exposure to the notified chemical may result in skin and/or eye irritation. As limited data is available on the health effects of the notified chemical (and as the notified chemical was found to be hazardous in all available studies conducted for the purposes of hazard identification) and given the highly functionalised structure of the notified chemical, caution should be exercised when handling the notified chemical during reformulation processes.

The use of enclosed, automated processes and PPE (e.g. impervious gloves, coveralls, eye protection and respiratory protection, where necessary) should minimise the potential for exposure. Occupational surveillance programs should be in place for workers which may be at a significant risk of sensitisation. Therefore, provided that adequate control measures are in place to minimise worker exposure, the risk to workers from use of the notified chemical is not considered to be unreasonable.

*End-use*
Cleaners, hair and beauty care professionals will handle the notified chemical at ≤ 0.01% concentration. Such professionals may use PPE to minimise repeated exposure, and good hygiene practices are expected to be in place. If PPE is used, 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 (for details of the public health risk assessment, see Section 6.3.2.).

#### 6.3.2. Public Health

*Sensitisation*
The main identified risk associated with use of the notified chemical at the proposed concentration of ≤ 0.01% in cosmetic and household products, is its potential to cause sensitisation by skin contact.

Proposed methods for the quantitative risk assessment of dermal sensitisation have been the subject of significant discussion (see for example, Api *et al.*, 2008 and RIVM, 2010). As is shown in the table below, the Consumer Exposure Level (CEL) from use of the notified chemical in a number of different cosmetic products may be estimated (SCCS, 2012 and Cadby *et al*, 2002). When tested at 0.1% concentration in a human repeat insult patch study (0.2 mL applied to 4 $cm^2$ patches), the notified chemical was determined by the study authors to not be a skin sensitiser. Consideration of the details of the study, and application of appropriate safety factors, allowed the derivation of an Acceptable Exposure Level (AEL) of 0.18 $\mu g/cm^2$. In this instance, the factors

employed included an interspecies factor (1), intraspecies factor (10), a matrix factor (3.16), a use and time factor (3.16) and a database factor (3.16), giving an overall safety factor of ~300.

| Product type | Proposed maximum usage concentration (%) | CEL chemical (μg/cm$^2$) | AEL chemical (μg/cm$^2$) | Proposed usage concentration supported? | Recommended usage concentration (%) |
|---|---|---|---|---|---|
| Fine fragrances | 0.01 | 0.38 | 0.18 | No | ≤ 0.0049 |
| Deodorant spray | 0.01 | 0.72 | 0.18 | No | ≤ 0.0026 |
| Body lotion | 0.01 | 0.05 | 0.18 | Yes | ≤ 0.01* |
| Other leave-on cosmetics (assumed: face cream) | 0.01 | 0.27 | 0.18 | No | ≤ 0.0067 |
| Rinse-off cosmetics (assumed: hand wash soap | 0.01 | 0.02 | 0.18 | Yes | ≤ 0.01* |

*Proposed usage concentration

As the CEL > AEL for fine fragrances, deodorant spray and other leave-on cosmetics (using face cream as a worst case example), the risk to the public of the induction of sensitisation that is associated with the use of the notified chemical in these product types at ≤ 0.01% concentration is considered to be unreasonable. Reducing the concentration of the notified chemical in deodorant spray to 0.0026%, fine fragrances to 0.0049% and other leave-on cosmetic products to 0.0067%, allows recalculation of the consumer exposure to acceptable levels.

As the AEL>CEL, the risk to the public of the induction of sensitisation that is associated with the use of the notified chemical in body lotion and rinse-off cosmetic products (using hand wash soap as a worst case example) at ≤ 0.01% concentration is not considered to be unreasonable.

Based on the lower expected exposure level from use of household products (≤ 0.01% 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.

*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 (revised) 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 at ≤ 0.0026% in deodorants, ≤ 0.0049% in fine fragrances, ≤ 0.01% in body lotion, ≤ 0.0067% in other leave-on cosmetic products and ≤ 0.01% in rinse-off cosmetic and household products, is not considered to be unreasonable. In the absence of data on the repeated 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 will be 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 the sewer across Australia as a result of its use in cosmetic and household products, which will be washed off the hair and skin of consumers as well as from washings of the cleaning activities and disposed of to the sewer. A small percentage of up to 3% of the total import volume of the notified chemical, as residues in empty end use containers, is expected to be disposed of to landfill.

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 before potential release to surface waters on a nationwide basis. The majority of the notified chemical will enter the sewer system as a result of the use of the notified chemical as a component of fragrance preparations such as cosmetic and household products. Based on its predicted low adsorption coefficient (log $K_{oc}$ = 1.75 to 1.82), only limited partitioning to sludge is expected. The notified chemical has low potential to bioaccumulate based on its predicted low partition coefficient (log Kow = 1.75). In surface waters, the notified chemical is expected to disperse and degrade through biotic and abiotic processes to form water and oxides of carbon, nitrogen and sulphur.

The notified chemical is expected to have low volatility from water (log H = 5.6 x $10^{-3}$ Pa/$m^3$/mol) and may not significantly volatilise to air during use or sewage treatment based on calculations for the notified chemical. In the event of release to atmosphere, the notified chemical is not expected to persist in the air compartment based on calculations (AOPWIN v1.92; US EPA, 2011) for the notified chemical.

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 and soil are expected to be moderately mobile based on its low adsorption coefficient, and are expected to degrade to form water and oxides of carbon, nitrogen 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 products, it is assumed that 100% of the total import volume of the notified chemical will be 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 | 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 0.6 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) = 44.4 mg/L | Expected to be harmful to fish |
| Daphnia | LC50 (48 h) = 5.1 mg/L | Expected to be toxic to aquatic invertebrates |
| Algae | EC50 (96 h) = 4.5 mg/L | Expected to be toxic to algae |

The ECOSAR estimation endpoints indicate that the notified chemical is potentially harmful to fish whilst it is potentially toxic to aquatic vertebrates and algae. 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 (daphnia, EC50) 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*** | | |
|---|---|---|
| EC50 (Invertebrates). | 4.5 | mg/L |
| Assessment Factor | 1,000 | |
| PNEC: | 4.5 | 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 | 4.5 | 0.135 |
| Q - Ocean: | 0.06 | 4.5 | 0.013 |

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 ± 0.5 °C

Method OECD TG 102 Melting Point/Melting Range.
BS4633: Method for the determination of Crystallizing Point.
Remarks The test material remained unchanged in appearance during cooling (using a dry ice/isopropanol bath).
Test Facility Firmenich (2003a)

**Boiling Point** 230.0 ± 0.5 °C at 97.8 kPa

Method OECD TG 103 Boiling Point.
Remarks Determined according to the Siwoloboff method.
Test Facility Firmenich (2003a)

**Density** 1157 kg/m$^3$ at 20.0 ± 0.5 °C

Method OECD TG 109 Density of Liquids and Solids.
Remarks Determined using the Oscillating density meter method.
Test Facility Firmenich (2003a)

**Vapour Pressure** 1.21 x 10$^{-2}$ kPa at 25 °C

Method OECD TG 104 Vapour Pressure.
OJEC, L 383 A, Method A.4 Vapour Pressure (1992).
Remarks Determined using the dynamic measurement method.
Test Facility Firmenich (2014a)

**Hydrolysis as a Function of pH** Hydrolytically unstable

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

| *pH* | *T (°C)* | *$t_{½}$ < days>* |
|---|---|---|
| 2 | 25 | <1 |
| 5 | 25 | <1 |
| 7 | 25 | 3.3 |
| 8.5 | 25 | 2.4 |
| 12 | 25 | <1 |

Remarks The concentration of the test substance after 5 days at 40 °C had decreased by more than 10% at any pH (from 2 to 12). The test substance is considered hydrolytically not stable according to the criterion in data reporting guidelines for hydrolysis studies according to this test.
Test Facility Firmenich (2014b)

**Flash Point** 115.0 ± 2.0 °C at 101.3 kPa

Method Commission Directive 92/69/EEC A.9 Flash Point.
Remarks Determined using a closed cup equilibrium method.
Test Facility Firmenich (2003a)

**Autoignition Temperature** 225.0 °C

Method Determined using an AIT instrument.
Test Facility Firmenich (2003b)

# 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 (Crl: CD (SD) IGS BR)
- Vehicle: 2,000 mg/kg bw dose level – used as supplied.
  300 mg/kg bw dose level – notified chemical in solution with distilled water.
- Remarks - Method: No significant protocol deviations.
  GLP Compliance.

RESULTS

| *Group* | *Number and Sex of Animals* | *Dose mg/kg bw* | *Mortality* |
|---|---|---|---|
| 1 | 3 F | 2,000 | 3/3 |
| 2 | 3 F | 300 | 0/3 |
| 3 | 3 F | 300 | 0/3 |

- LD50: ~ 300 – 500 mg/kg bw (300 – 2,000 mg/kg bw)
- Signs of Toxicity: Clinical signs were seen at both dosing levels. Animals dosed at 2,000 mg/kg bw showed signs including hunched posture, lethargy, ataxia, decreased respiratory rate, laboured respiration, increased lacrimation and/or splayed gait. These observations were noted on the day of dosing and the following day (with the animals found dead at the subsequent observation).
  The animals treated at 300 mg/kg bw presented with hunched posture, lethargy, ataxia, decreased respiratory rate and/or laboured respiration, on the day of dosing, but appeared normal the following day.
- Effects in Organs: Abnormalities noted in the 2,000 mg/kg bw group animals during necropsy included dark or patchy pallor of the liver, haemorrhagic lungs, dark kidneys, haemorrhage of the gastric mucosa and haemorrhage of the small intestine.
  No abnormalities were noted at necropsy in the animals dosed at 300 mg/kg bw.
- Remarks - Results: All animals treated at 2,000 mg/kg bw were found dead two days after dosing. The 300 mg/kg bw animals all survived and showed weight gains over the course of the study period.

  The study authors estimated the LD50 to be in the range of 300 – 500 mg/kg bw.

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

TEST FACILITY: Safepharm (2003)

## B.2. Skin sensitisation

TEST SUBSTANCE: Notified chemical

METHOD: OECD TG 406 Skin Sensitisation - Buehler test.
- Species/Strain: Guinea pig/Hartley albino
- PRELIMINARY STUDY: Maximum minimally irritating Concentration:
  topical: 75%
- MAIN STUDY
  - Number of Animals: Test Group: 20 Control Group: 10

| | |
|---|---|
| INDUCTION PHASE | Induction Concentration:<br>topical: 100% |
| Signs of Irritation | Very faint to severe erythema was observed on the application site of all animals treated with the test substance, on various days throughout the three weeks of administration. |
| CHALLENGE PHASE | topical: 75% |
| Remarks - Method | The test substance was used neat or prepared in distilled water.<br><br>A preliminary test was conducted at 25-100% concentration (using 4 female animals) to determine the appropriate concentrations for use in the induction and challenge phases.<br><br>The induction phase consisted of 9 applications over 3 weeks.<br><br>No positive control test was run in parallel to the main test, however it had been conducted previously in the test laboratory using α-Hexylcinnamaldehyde. |

RESULTS

| *Animal* | *Challenge Concentration* | *Number of Animals Showing Skin Reactions after: 1st challenge* | |
|---|---|---|---|
| | | *24 h* | *48 h* |
| *Test Group* | | | |
| challenge | 75% | 18/20 | 18/20 |
| *Control Group* | | | |
| previously unexposed | 75% | 0/10 | 0/10 |

| | |
|---|---|
| Remarks - Results | Very faint erythema was not considered a positive skin reaction by the study authors (only animals showing a greater response are reflected in the above table). |
| CONCLUSION | There was evidence of reactions indicative of skin sensitisation to the notified chemical under the conditions of the test. |
| TEST FACILITY | PSL (2004) |

**B.3. Skin sensitisation – human volunteers**

| | |
|---|---|
| TEST SUBSTANCE | Notified chemical (0.1% concentration in DEP) |
| 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 hours and graded after an additional 24 hours (or 48 hours for patches applied on Friday).<br>Rest Period: 10-15 days<br>Challenge Procedure: a patch was applied to a naïve site. Patches were removed by the applicants after 24 hours. Sites were graded 24 and 48 hours post-patch removal. |
| Study Group | 94 F, 21 M; age range 20 to 69 years |
| Vehicle | Diethyl Phthalate (DEP) |
| Remarks - Method | The test substance was spread on a 2 cm × 2 cm occluded patch.<br><br>A panel of 115 healthy human subjects (devoid of any physical or dermatological conditions) was amassed. Of these, 101 test subjects completed the study (10 subjects were lost to follow up, 3 subjects voluntarily withdrew; 1 subject was discontinued due to a protocol |

| | |
|---|---|
| | violation; 0-6 induction observations recorded). |
| RESULTS | |
| Remarks - Results | No reactions were evident in any test subject during the induction or challenge phases. |
| CONCLUSION | The test substance was non-sensitising under the conditions of the test. |
| TEST FACILITY | TKL (2005) |

# BIBLIOGRAPHY

Api AM, Basketter DA, Cadby PA, Cano MF, Ellis G, Gerberick GF, Griem P, McNamee PM, Ryan CA and Safford R (2008) Dermal Sensitisation Quantitative Risk Assessment (QRA) for Fragrance Ingredients, Regulatory Toxicology and Pharmacology, 52:3-23.

Cadby, PA, Troy, WR and Vey, MGH (2002) Consumer Exposure to Fragrance Ingredients: Providing Estimates for Safety Evaluation. Regulatory Toxicology and Pharmacology, 36:246-52.

Firmenich (2003a) Notified Chemical: Determination of General Physico-Chemical Properties (Study No. E009-02.2003, February, 2003). Geneva, Switzerland, Firmenich Laboratory of Analysis and Measurements (Unpublished report submitted by the notifier).

Firmenich (2003b) Autoignition Temperature "AIT": Corps Cereales (Report No. 6516-FRF, February, 2003). Geneva, Switzerland, Firmenich Safety Laboratory (Unpublished report submitted by the notifier).

Firmenich (2014a) Vapour Pressure: Corps Cereales (Report No. 100829-DMR, June, 2014). Geneva, Switzerland, Firmenich Process Safety and Analytical Development Laboratory (Unpublished report submitted by the notifier).

Firmenich (2014b) Stability Test of Perfumery Raw Materials (May, 2014). Geneva, Switzerland, Firmenich Process Safety and Analytical Development Laboratory (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 (2004) Notified Chemical: Dermal Sensitisation Test – Buehler Method (Study No. 15485, August, 2004) New Jersey, Product Safety Laboratories (Unpublished report submitted by the notifier).

Safepharm (2003) Notified Chemical: Acute Oral Toxicity in the Rat – Acute Toxic Class Method (Study No. 161/384, July, 2003). Derbyshire, U.K, Safepharm Laboratories Limited (Unpublished report submitted by the notifier).

SCCS (2012) Notes of Guidance for testing of Cosmetic Ingredients and Their Safety Evaluation (7th revision) European Commission - Scientific Committee on Consumer Safety.

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, v 4.10. United States Environmental Protection Agency. Washington DC, USA.