LEVOGLUCOSENONE

Version No. 008, Revision Date 9.11.2018

SECTION 1 – IDENTIFICATION

1.1 Product Identifiers

Product Name : **Levoglucosenone**

CAS Number : **37112-31-5**

EC Number : None allocated

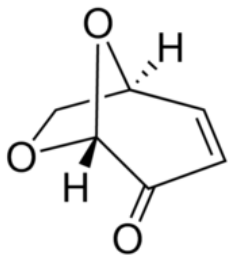
1.2 Other means of identification :

(1*S*, 5*R*)-6,8-dioxabicyclo[3.2.1]oct-2-en-4-one

1,6-anhydro-3,4-dideoxyhex-3-enopyran-2-ulose

(-)-Levoglucosenone

LGO; or LGE



1.2 Recommended use of chemical and restrictions on use

This substance is used in the following products: laboratory chemicals and as an intermediatory in the synthesis of dihydrolevoglucosenone (Cyrene™).

This substance is used in the following areas: scientific research and development [SU24].

This substance is used for the manufacture of: fine chemicals [SU9].

This substance is used in the following activities or processes at workplace: transfer of chemicals, closed processes with no likelihood of exposure, closed, continuous processes with occasional controlled exposure, closed batch processing in synthesis or formulation, batch processing in synthesis or formulation with opportunity for exposure, mixing in open batch processes, transfer of substance into small containers and laboratory work.

Substance currently mainly used in novel organic synthesis and scientific research and development. Currently no restrictions on use.

1.3 Details of manufacturer

Company : **CIRCA GROUP PTY LTD**

Address : Building 404, Bio21 Institute, University of Melbourne, 30 Flemington Road, Parkville, Victoria 3010, AUSTRALIA

Telephone : +61 (0) 419 303 117

Email : service@circagroup.com.au

1.4 Emergency Telephone Number

Emergency Telephone : **+61 (0) 428 047 874**

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SECTION 2 – HAZARDS IDENTIFICATION

2.1 GHS Classification : **Causes serious eye irritation (Category 2A)**

: **Acute toxicity, Oral (Category 4)**

2.2 GHS Label elements and precautionary statements

Pictograms :

Signal Word : **WARNING**

Hazard Statements : **Causes serious eye irritation (H319)**

: **Harmful if swallowed (H302)**

Precautionary Statements : **PREVENTION**

P202	**Do not handle until all safety precautions have been read and understood.**
P262	**Do not get in eyes, on skin, or on clothing.**
P261	**Avoid breathing mist and vapours.**
P270	**Do not eat, drink or smoke when using this product.**
P264	**Wash skin thoroughly after handling.**
P280	**Wear protective clothing, gloves and eye /face protection.**
	RESPONSE
P305 + P351 + P338	**IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.**
P337 + P313	**If eye irritation persists, get medical advice/attention**
P332 + P313	**If skin irritation occurs, get medical advice/attention**
RESPONSE	
P301 + P312 + P330	**IF SWALLOWED: Call a POISON CENTRE or doctor/ physician if you feel unwell. Rinse mouth. Apply artificial resuscitation if necessary.**

SECTION 2 - - - - - **CONTINUED**

2.3 OTHER HAZARDS

Testing has confirmed that LGO is not a Class 3 Flammable liquid.

Testing has confirmed that LGO is not a Class 8 Corrosive substance.

Bacterial Reverse Mutation Testing (Ames Test) confirmed that LGO showed no evidence of mutagenic activity in this bacterial system under the test conditions employed.

SECTION 3 – COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substance

LEVOGLUCOSENONE Formula**: C6 H6 O3**

CAS Number	**Concentration**	**Chemical Names**
37112-31-5	≥ 98.0%	(1*S,* 5*R*)-6,8-dioxabicyclo[3.2.1]oct-2-en-4-one
		1,6-anhydro-3,4-dideoxyhex-3-enopyran-2-ulose
		(-)-Levoglucosenone
		LGO or LGE

Molecular Weight: 126.11 g/mol

SECTION 4 – FIRST AID MEASURES

4.1 Description of first aid measures

General Information : Get medical attention if symptoms severe or persistent. Show this Safety Data Sheet to medical personnel.

Inhalation : If breathed in, move person to fresh air. If not breathing, give artificial respiration. If symptoms severe or persistent, seek medical attention.

Ingestion : If swallowed**,** rinse mouth thoroughly with water**.** Never give anything by mouth to an unconscious person. Do not induce vomiting.

SECTION 4 - - - - - **CONTINUED**

SEEK MEDICAL ATTENTION AS CAN BE HARMFUL BY INGESTION.

Skin Contact	:	Remove all contaminated clothing. Wash affected areas with soap and large amounts of water for at least 15 minutes. If symptoms severe or persistent, seek medical attention
Eye Contact	:	Rinse eye(s) with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing for 15 minutes.

SEEK MEDICAL ATTENTION AS KNOWN TO BE AN EYE IRRITANT.

Protection of First-Aiders	:	No specific precautions. First aid personnel should wear appropriate protective clothing and equipment.

4.2 Most important symptoms and effects, both acute and delayed

Levoglucosenone will cause eye irritation and is harmful by ingestion. In some individuals, even brief exposure to low levels of vapour can cause skin rashes. Skin rashes may appear in areas of contact up to 7 days following exposure. Repeated exposure to the liquid and/or vapour can cause sensitisation.

No quantitative data on human exposures in industrial settings is available.

General Information	:	The severity of symptoms described may vary depending on the concentration and duration of exposure.
Inhalation	:	Will be harmful. Will cause irritation.
Ingestion	:	Will be harmful. Symptoms may be delayed.
Skin Contact	:	May cause irritation. Symptoms may be delayed.
Eye Contact	:	Causes severe eye irritation. Will cause tears.

4.3 Indication of any immediate medical attention and special treatment needed

None specified. Treat symptomatically.

SECTION 5 – FIRE FIGHTING MEASURES

5.1 Suitable extinguishing equipment:

In the event of a fire extinguish using carbon dioxide, dry chemical, alcohol-resistant foam, sand or similar.

SECTION 5 - - - - - **CONTINUED**

Do not use water as it will only disperse the product.

Water may be used to cool adjacent exposures.

Unsuitable extinguishing equipment: DO NOT USE WATER

5.2 Specific hazards arising from the substance

Potentially hazardous combustion products: arising from the products of incomplete combustion (a variety of organic compounds, including LGO vapour that is intensely irritating to the eyes, nasal passages and lungs) and carbon monoxide.

The potentially hazardous products formed are dependent on combustion temperature and availability of combustion air. A clean burning fire with little or no smoke will generate fewer hazardous combustion products than a fire generating significant dark smoke and odours.

Efficient combustion of LGO will generate only carbon dioxide and water.

5.3 Advice for fire fighters

Protective actions during firefighting:

Avoid breathing emissions of smoke and vapours. Evacuate upwind. Fight fire from upwind. Do not apply water directly to fire, but cool plant and equipment, and containers exposed to heat with water sprays and remove product from fire area if this can be done without risk.

Keep adjacent exposures cool with water sprays. Control firewater runoff. Avoid discharges to the aquatic environment.

Protective equipment during firefighting:

If exposure to smoke and vapours is possible wear positive-pressure self-contained breathing apparatus and appropriate protective clothing (including helmets, boots, gloves, etc.)

HAZCHEM CODE: 3ZE or 4ZE

SECTION 6 – ACCIDENTAL RELEASE MEASURES

6.1 Personnel precautions, protective equipment and emergency procedures

Non-Emergency Personnel

Wear protective clothing as described in Section 8 of this SDS. No action shall be taken without appropriate training or involving any personnel risk. Prevent further leakage or spillage if safe to do so. If necessary, temporarily seal off nearby stormwater drains. Avoid breathing vapours. Avoid spilled material. Ensure adequate ventilation. If not, move to fresh air.

Emergency Responders

Prevent further leakage or spillage if safe to do so. If a large quantity has been released, evacuate all personnel and only allow intervention by trained responders fitted with positive-pressure self-contained breathing apparatus and appropriate protective clothing (including helmets, boots, gloves, etc.) to engage in emergency management and clean-up.

6.2 Environmental precautions

Wherever possible, contain and collect spillage. Avoid discharge to aquatic systems and land.

Do not discharge or wash down to stormwater or sewage systems.

Where off-site discharge to land or water occurs immediately contact local environmental regulator.

Manage any wastes produced during clean-up in accordance with applicable environmental regulatory requirements.

6.3 Methods and materials for containment and clean-up

Absorb on sand, vermiculite, diatomaceous earth or any inert absorbent material and place in suitable container and seal. Store container outside in a secure area for disposal. Contact and arrange disposal by an approved waste transportation and disposal company.

Residual levoglucosenone liquid films remaining on surfaces after absorbent material has been applied and removed should be cleaned with domestic bleaching agents, such as hypochlorite.

Where the waste product is regulated by EPA the Waste Generator must complete Part A of a Waste Transport Certificate provided by the waste transporter, and send one copy to EPA and retain the other. Alternatively, an electronic version of this requirement may be available.

6.4 Reference to other sections

The following sections are also relevant in dealing with accidental release scenarios:

- Section 8 Personal Protection and Exposure
- Section 11 Toxicological Information
- Section 12 Ecological Information
- Section 13 Disposal Considerations

SECTION 7 – HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Wear suitable gloves and eye/face protection.

Promptly wash if in contact with skin. Take off any contaminated clothing and wash before reuse.

Avoid inhalation of vapours or mists. Wear respiratory protection, if required.

SECTION 7 - - - - - **CONTINUED**

Ensure adequate ventilation of stores and work areas.

Substance should only be handled by persons suitably qualified and competent in handling potentially hazardous substances.

7.2 Conditions for safe storage, including any incompatibilities

Store in a tightly closed container in a cool, dry, and well ventilated bunded area.

Keep containers upright. Protect containers from damage.

Stable for many weeks when stored at <30^{o}C.

Stable for up to 12 months when stored at temperatures <-14^{o}C.

The product is combustible. Do not store with Class 5 Oxidising Substances.

The product can react with strong acids and alkalis. Do not store with Class 8 substances.

SECTION 8 – EXPOSURE CONTROLS AND PERSONAL PROTECTION

Note: The full toxicological and physiological properties of LGO are not currently known so a **precautionary approach should be adopted** with respect to chemical hygiene and personal protection from exposure.

8.1 Occupational exposure limits

No occupational exposure limits have been published in any jurisdiction.

An occupational exposure limit will be derived when sufficient toxicological information on this substance becomes available.

8.2 Exposure control measures

Engineering control measures:

Handle and process material in enclosed systems, wherever possible.

Vent any discharges externally to atmosphere, wherever possible.

Ensure adequate workplace ventilation.

Personal protection measures:

Eye/Face protection

Wear safety glasses/goggles with side shields when handling small quantities and full face shields when handling larger quantities.

Protection should be compliant with *AS/NZS 1337: Occupational eye and face protection* (Australia/New Zealand) or for UK/EC the relevant ISO or EN standard (e.g. EN 166).

Skin/Hand protection

Wear protective gloves made of neoprene, nitrile or buyl rubber. Inspect gloves for damage prior to use. Use proper glove removal technique (without touching gloves outer surface) to avoid contact with product.

Protection should be compliant with *AS/NZS 2161.10.3:2005, Occupational Protective Gloves Part 10: Protective gloves against chemicals and micro-organisms - Determination of resistance to permeation by chemicals* (Australia/New Zealand), or for UK/EC the relevant ISO or EN standard (e.g. EN 374-3:2003).

Skin/Body protection

Wear impervious clothing when handling liquid LGO. The level of body protection from protective clothing will be dependent on the potential for exposure to the material. PVC aprons or splash suits may be warranted in particular applications.

Skin/body protection should be compliant with *AS/NZS 4501.1:2008: Occupational protective clothing—Guidelines on the selection, use, care and maintenance of protective clothing*; and *AS/NZS 4501.2:2006: Occupational protective clothing—General requirements*; or for UK/EC the relevant ISO or EN standard (e.g. ISO 16602:2007).

Respiratory protection:

LGO has a low vapour pressure, however the vapour is intensely irritating to the eyes and nasal passages so respiratory protection will generally be required when handling under ambient conditions.

In the laboratory small quantities should be handled in a fume cupboard.

Respiratory protection:

For large quantities, or handling at elevated temperatures, use a full face respirator with combination cartidge(s) for particulates, acid gases and organic vapours. Use approved respirators and cartridges.

Protection should be compliant with *AS/NZS 1715:2009: Selection, use and maintenance of respiratory protective equipment* (Australia/New Zealand), or for UK/EC the relevant ISO or EN standard.

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SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Nature/Appearance : Pale yellow oily liquid at room temperature.

Odour : Mild pungent ketonic odour, is intensely lachrymatory.

pH : **2.95** (10% solution in water)

Melting Point : **0°C** (at 101.3 kPa)

Boiling Point : **254.4°C** (at 101.3 kPa, extrapolated, decomposes below this temp)

: **113°C** (at 0.4 kPa) (**Note**: Any distillation should occur at <5 kPa.)

Flash Point : **117°C** (closed cup, ASTM D93/A.9. EG method, 1atm)

Fire Point : **130°C** (open cup, ASTM D92, 1 atm)

Auto-ignition Temp : **320°C** (PE165/based on ASTM E659-15)

Decomposition Temp : **>150°C**

Flammability : Not classified as a flammable liquid. Not flammable on contact with water.

LEL – UEL : **Not applicable**

Vapour Pressure : **0.052 kPa** (at 25°C) (estimated) Very low at ambient conditions.

Vapour Density : **No data available**

Liquid Density : **1.32 g/cm^3** (at 20°C)

Solubility : Soluble in water (up to 10 w/w%).

: Completely miscible in most polar organic solvents

Biodegradability : Ready biodegradable (predicted, EPI Suite)

Octanol/Water Partition Coefficient (K_{ow}): log K_{ow} = -0.74 to -0.21 (estimated)

SECTION 10 – STABILITY AND REACTIVITY

10.1 Reactivity

No hazardous reactions if stored and handled as prescribed.

10.2 Stability

The product is stable if stored and handled as prescribed.
Stable for many weeks when stored at <30°C.
Stable for up to 12 months when stored at temperatures <-14°C.

Thermal Stability

Combustible. Fire Point:	≥ 130°C.
Thermal Decomposition:	> 150°C.
Auto-ignition Temperature:	≥ 320°C.

10.3 Possibility of hazardous reactions

Reacts with strong acids, strong alkalis, strong oxidising and reducing agents.

10.4 Conditions to avoid

Temperatures above 130°C when ignition sources present.
Temperatures above 150°C, as substance will decompose.
Temperatures above 320°C, as auto-ignition of vapours is likely.
Exposure to moisture, direct sunlight and/or air should be kept to a minimum.

10.5 Incompatible materials

Reacts with strong acids, strong alkalis, strong oxidising and reducing agents.

10.6 Hazardous decomposition products

LGO is an organic compound composed of carbon, hydrogen and oxygen. Efficient and complete thermal oxidation (combustion) will produce carbon dioxide and water.

Incomplete thermal decomposition can liberate carbon monoxide and unknown pyrolysis products or products of incomplete thermal oxidation (combustion efficiency dependent of temperature and availability of sufficient combustion air).

Unknown pyrolysis products, or products of incomplete thermal oxidation, should be considered potentially hazardous.

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SECTION 11 – TOXICOLOGICAL INFORMATION

Acute Toxicity : **LD50 2,000 mg/kg (oral, rat)** (Apollo Scientific, Category 4)

Skin Corrosion/Irritation : **Skin Irritant** – no data available

: **Non-corrosive** (OECD TG 435) (Corrositex Method)

Serious Eye Damage/Irritation : **Serious Eye Irritant** (Category 2A) (Ocular Irritection Method)

Skin Sensitisation : **Possible.** No data available

Respiratory Sensitisation : No data available

Carcinogenicity : **Negative** (dermal, mouse) (CCRIS Record No. 4274)

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Mutagenicity: Bacterial Reverse Mutation Testing (Ames Test) confirmed that LGO showed no evidence of mutagenic activity in this bacterial system under the test conditions employed (Circa).

Chromosomatic aberrations : ***In Vitro* Chromosomal Aberration Test** (TG 473) showed an increase in the frequency of structural chromosome aberrations in human lymphocytes (Circa). Aberrations/reduced mitosis of somatic cells in a dose dependent fashion around 4 µg/mL *in vitro* (Chinese hamster v79 cells) (MEDLINE/2797043)

Reproductive Toxicity : No data available

Specific Target Organ Toxicity (STOT) – single exposure : **Eyes.** No other data available

Specific Target Organ Toxicity (STOT) – repeated exposure : **Eyes.** No other data available

Aspiration Hazard : No data available

<u>Potential Routes of Exposure and Health Effects</u>

Inhalation : Will be harmful if inhaled. Will cause respiratory tract irritation.

Ingestion : **Will be harmful if swallowed.**

Skin : Will cause skin irritation and sensitisation on repeated exposure.

Eyes : **Will cause severe eye irritation. Vapours are lachrymatory.**

Note : If symptoms are severe or persistent seek medical attention.

Early onset symptoms related to exposure No data available.

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SECTION 11 - - - - - **CONTINUED**

Delayed health effects from exposure No data available. Potential delayed irritation of eyes, nasal passages, lungs and skin.

Exposure Levels and Health Effects No data available.

Interactive effects

No known interactive effects from drinking alcohol, taking medications or smoking.

No known aggravation of pre-existing medical conditions or predisposition to allergic reactions. However, **extra precautions** should be taken by persons with lung conditions, such as asthma, chronic bronchitis or emphysema to minimise exposure by inhalation.

Note: The full toxicological and physiological properties of LGO are not currently known so a **precautionary approach should be adopted** with respect to chemical hygiene and personal protection from exposure.

SECTION 12 – ECOLOGICAL INFORMATION

12.1 Ecotoxicity

Algae: No data available

Planktonic Crustaceans: No data available

Aerobic Bacteria: No data available

Fish: No data available

Plants: No data available

12.2 Persistence and Degradability

Biodegradation : Readily biodegradable (predicted, EPI Suite)

Biological Oxygen Demand (BOD): No data available.

Chemical Oxygen Demand (COD): No data available.

12.3 Bio-accumulative potential

This product is not expected to persist and/or bio-accumulate in the aquatic environment (log K_{ow} = -0.74 to -0.21, and BCF <500, estimated).

12.4 Mobility in Soil

No available data. Product is soluble in water (up to 10%w/w) and biodegradable.

The substance has a low octanol/water partition coefficient (Log K_{ow}) and is therefore expected to have a low potential for adsorption into organic sediments or soils.

12.5 Other adverse effects No data available

SECTION 13 – DISPOSAL CONSIDERATIONS

13.1 Regulatory Requirements

The generation of waste should be minimized or avoided wherever possible.

Recover, recycle and/or reuse waste products wherever possible.

Waste must be disposed of safely according to local environmental regulations. When handling waste, the safety precautions applying to the handling of the product should be considered.

Consult with the EPA as to whether the waste product is regulated as a prescribed or listed waste, as special waste management provisions and disposal requirements may be required.

If deemed a regulated waste then compliance with the applicable regulatory provisions is required. This can include use of EPA licensed or permitted waste transporters, waste storage, treatment, and/or disposal premises.

13.2 Waste Handling

The clean-up and collection of waste generated through any accidental release should take place by trained personnel appropriately outfitted with protective clothing and equipment, as described in Sections 6, 7 and 8 of this SDS, until the waste has been collected and contained in sealed containers.

Care should be taken when handling emptied containers that have not been thoroughly cleaned or rinsed out. Empty containers may retain some product residues. Empty containers containing product residues should be rinsed thoroughly with alkaline cleaning agents, such as sodium hypochlorite (5%) or sodium hydroxide (0.001N), that will convert levoglucosenone to non-irritant, water-soluble, biodegradable compounds.

Waste, residues, empty containers, contaminated work clothes and contaminated cleaning materials should be collected in designated containers, and labelled prior to disposal.

13.3 Waste Packaging and Labelling

Metal or plastic containers with tight fitting closures are recommended for this product.

Containers should be labelled with type of waste and generators details (e.g. company name).

13.4 Waste Storage

Store in a cool, dry, and well ventilated bunded area. Keep containers upright. Protect containers from vehicular damage.

13.5 Waste Transport and Tracking

Where the waste product is regulated by EPA the waste transporter may require EPA approval to transport the waste to an EPA licensed waste storage, treatment, and/or disposal premises.

Where this is the case the waste generator must complete Part A of the Waste Transport Certificate (usually provided by the waste transporter) and send one copy to EPA and retain the other.

Alternatively, an electronic version of this requirement may be available.

13.6 Waste Disposal

Where recovery, recycling and reuse is not practicable waste product can be disposed via a number of methods depending on the form and concentration of the waste product.

EPA should be consulted as to what local disposal options may be available.

Waste Water Treatment Plant

Liquid waste product may be able to be disposed to the site's waste water treatment plant at an appropriate concentration and rate. Consult appropriate personnel before discharge.

Sewer

Where liquid waste product has been diluted and collected in wash waters it may be able to be disposed to sewer in a controlled manner. Consultation and approval by the local sewage authority is required for this to occur.

Thermal Treatment

Liquid and solid waste product can be disposed of by incineration/gasification. The product is combustible and will only generate emissions of carbon dioxide and water if treated properly.

The thermal treatment facility will need to be licensed by EPA for this purpose.

Landfill

Solid waste product (e.g. absorbent used to mop up a spill) may be able to be disposed to secure landfill. Consult with EPA and local landfill operators to determine if this is possible. If landfill is not an option, then thermal treatment is the best disposal option for solid wastes.

Incineration and landfill should only be considered when recycling is not feasible.

SECTION 13 - - - - - **CONTINUED**

Do not empty waste into storm water drains.

Waste Management Plan

The details concerning waste classification, collection, packaging, labelling, storage, transport and recycling, treatment and/or disposal should be outlined in the site's waste management plan.

SECTION 14 – TRANSPORT INFORMATION

14.1 UN number: Not Applicable. **Not classified as a dangerous goods.**

ADR/RID:	**Not dangerous goods** (Road and Rail Transport)
IMDG:	**Not dangerous goods** (Maritime Transport)
IATA-DGR:	**Not dangerous goods** (Air Transport)

14.2 UN proper shipping name

Not Applicable. Not classified as a dangerous goods.

14.3 Transport hazard class(es)

Does not meet classification criteria for assignment of a dangerous goods hazard class.

14.4 Packaging group

Does not meet classification criteria for assignment of a dangerous goods hazard class, so assignment of packaging group not applicable.

14.5 Environmental hazards

ADR/RID:	**No**
IMDG Marine pollutant:	**No data available**
IATA-DGR:	**No**

14.6 Special precautions for user

No special precautions unless accidental release occurs, then the provisions and advice of this SDS are applicable (refer in particular to sections 8 and 11 of this SDS).

14.7 Additional Information

None

14.8 HAZCHEM Code: **3ZE or 4ZE**

SECTION 15 – REGULATORY INFORMATION

15.1 International

LGO is not classified as a dangerous goods or carcinogen under international requirements.

LGO is not an ozone depleting substance or a persistent organic pollutant, as defined by UN Conventions.

15.2 Safety, Health and Environmental Regulations

Various occupational health and safety and environmental legislation, regulations, policy and guidelines will be applicable to the management, use, and disposal of this substance.

Requirements will vary from jurisdiction to jurisdiction. Consultation is required.

If in doubt as to its regulatory status contact the local relevant competent authority (e.g. WorkSafe, EPA, etc).

Guidance is provided in this SDS to enable basic compliance with expected occupational health and safety and environmental requirements.

LGO is not regulated under the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) established under the *Therapeutic Goods Act 1989* (Commonwealth) (as amended).

LGO is not regulated under the *Agricultural and Veterinary Chemicals Act 1988* (Commonwealth) and/or applicable Commonwealth, State or Territory control-of-use legislation.

LGO is currently not registered under the *Industrial Chemicals (Notification and Assessment) Act 1989* (Commonwealth), including listing in the Australian Inventory of Chemical Substances (AICS).

LGO is currently not listed in Australia's waste coding and classification system. The applicable generic entry of '*organic solvents and solvent residues*' (item 7), '*wastes arising from the production, formulation and use of organic solvents, not otherwise specified in this item*' (description of waste), provides a waste code of G160 for this product, as it is not classified as a dangerous good. Consultation with EPA is required to determine if this waste product is to be regulated as such.

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SECTION 16 – OTHER INFORMATION

LGO is used as a chiral building block in organic synthesis and is currently being assessed for a variety of industrial applications in the research and development of industrial products and pharmaceuticals.

Currently typically used in small quantities in a laboratory R&D environment.

The full toxicological and physiological properties of LGO are not currently known so a **precautionary approach should be adopted** with respect to chemical hygiene and personal protection from exposure.

The pharmacological, toxicological, and ecological properties of this product have not been fully characterised. This data sheet will be updated as more data become available.

Circa Group believes the above information to be correct but does not claim that it is comprehensive. The information provided is intended to be used as a guide only. The information is based on the present state of Circa's knowledge and is applicable to the product with regard to appropriate safety and environmental precautions. It does not represent any guarantee of the properties of the product. Circa Group Pty. Ltd., shall not be held liable for any damage resulting from handling or from contact with the above product.