1 Identification of the substance/mixture and of the company/undertaking

- **Product identifier**
  - **Trade name:** γ-butyrolactone (GBL)
  
- **Synonyms:**
  - gamma-butyrolactone, butyrolactone, BLO, 1,4-lactone, 4-butyrolactone, 4-hydroxybutyric acid lactone, gamma-hydroxybutyric acid lactone, oxolan-2-one, Dihydro-2(3H)-Furanone

- **CAS Number:**
  - 96-48-0

- **Relevant identified uses of the substance or mixture and uses advised against:**
  - **Identified/Recommended uses:**
    - Chemical for synthesis
    - Flavouring agents
    - Solvent
    - Raw Material for:
      - Cleaning agent/ Cleaner
      - Surface cleaning

- **Details of the supplier of the safety data sheet**
  - **Manufacturer/Supplier:**
    - Dairen Chemical Corporation
    - 9th Fl., No. 301, SongJiang Rd.
    - Taipei City, 10483, TAIWAN
    - Tel: +886-2-7743-1500 Fax: +886-2-2509-9619
    - www.dcc.com.tw
  
- **Further information obtainable from:** Respective plant's environmental, health, and safety (EHS) Dept.

- **Emergency telephone number:**
  - +886-2-7743-1500 (08:30-17:30; GMT+8)

2 Hazards identification

- **Classification of the substance or mixture**
  - Eye Dam. 1  H318  Causes serious eye damage.
  - Acute Tox. 4  H302  Harmful if swallowed.
  - STOT SE 3  H336  May cause drowsiness or dizziness.

- **Label elements**
  - **GHS label elements**
    - The substance is classified and labelled according to the Globally Harmonised System (GHS).

- **Signal word**
  - **Danger**

- **Hazard-determining components of labelling:**
  - gamma-butyrolactone

- **Hazard statements**
  - Harmful if swallowed.
  - Causes serious eye damage.
  - May cause drowsiness or dizziness.

- **Precautionary statements**
  - Wear protective gloves/protective clothing/eye protection/face protection.
  - Avoid breathing dust/fume/gas/mist/vapours/spray.
  - Wash thoroughly after handling.
  - Do not eat, drink or smoke when using this product.

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Trade name: γ-butyrolactone (GBL)

Use only outdoors or in a well-ventilated area.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Immediately call a POISON CENTER/doctor.
IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
Rinse mouth.
Store locked up.
Store in a well-ventilated place. Keep container tightly closed.
Dispose of contents/container in accordance with local/regional/national/international regulations.

3 Composition/information on ingredients

- Chemical characterisation: Substances
  - CAS No. Description
    - 96-48-0 gamma-butyrolactone ≥ 99.7%
- Identification number(s)
  - EC number: 202-509-5

4 First aid measures

- Description of first aid measures
  - General information:
    Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.
  - After inhalation: Supply fresh air; consult doctor in case of complaints.
  - After skin contact: Immediately wash with water and soap and rinse thoroughly.
  - After eye contact:
    Rinse opened eye for 15 minutes under running water. If symptom persists consult a doctor.
  - After swallowing:
    Drink plenty of water and provide fresh air. Call for a doctor immediately. Do not induce vomiting unless directed to do so by medical personnel.
- Most important symptoms and effects, both acute and delayed
  - CNS disorders
  - Drowsiness
  - Dizziness
  - Respiratory arrest
- Indication of any immediate medical attention and special treatment needed
  Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

5 Firefighting measures

- Extinguishing media
  - Suitable extinguishing agents:
    CO₂, powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
    Use fire extinguishing methods suitable to surrounding conditions.
- Special hazards arising from the substance or mixture
  - Carbon monoxide (CO)
  - Carbon dioxide (CO₂)
- Advice for firefighters
  - Protective equipment:
    Wear protective fire fighting clothing (including fire fighting helmet, coat, trousers, boots, and gloves).
6 Accidental release measures

- **Personal precautions, protective equipment and emergency procedures**
  Wear protective equipment. Keep unprotected persons away.
  Ensure adequate ventilation.
  Do not breathe dust/fume/gas/mist/vapours/spray.

- **Environmental precautions:**
  Dilute with plenty of water.
  Do not allow to enter sewers/surface or ground water.

- **Methods and material for containment and cleaning up:**
  Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
  Dispose contaminated material as waste according to item 13.
  Ensure adequate ventilation.

- **Reference to other sections**
  See Section 7 for information on safe handling.
  See Section 8 for information on personal protection equipment.
  See Section 13 for disposal information.

7 Handling and storage

- **Precautions for safe handling**
  Ensure good ventilation/exhaustion at the workplace.
  Prevent formation of aerosols.
  Wear protective gloves/protective clothing/eye protection/face protection.

- **Information about fire - and explosion protection:** No special measures required.

- **Storage:**
  Requirements to be met by storerooms and receptacles:
  Store in cool, dry place in tightly closed receptacles.
  Suitable material for receptacles and pipes: Stainless steel.
  Suitable material for receptacles and pipes: Soft steel.

- **Further information about storage conditions:** Keep container tightly sealed.

8 Exposure controls/personal protection

- **Additional information about design of technical facilities:**
  Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines.
  Local exhaust ventilation may be necessary for some operations.
  Technical measures and appropriate working operations should be given priority over the use of personal protective equipment.

- **Control parameters**
  **Ingredients with limit values that require monitoring at the workplace:** Not required.
  **DNELs:**
  **Workers:**
  DNEL (inhalaion, chronic effects systemic): 130 mg/m³, AF=3
  DNEL (inhalaion, acute effects systemic): 958 mg/m³, AF=9
  DNEL (dermal, chronic effects systemic): 19 mg/kg bw/day

  **Consumers:**
  DNEL (inhalaion, chronic effects systemic): 28 mg/m³, AF=5
  DNEL (inhalaion, acute effects systemic): 340 mg/m³, AF=15
  DNEL (dermal, chronic effects systemic): 8 mg/kg bw/day; AF=20
**Trade name: γ-butyrolactone (GBL)**

DNEL (oral, chronic effects systemic): 8 mg/kg bw/day; AF=20

- **PNECs**
  - PNEC (fresh water): 0,056 mg/l with assessment factor of 1000
  - PNEC (marine water): 0,0056 mg/l with assessment factor of 10000
  - PNEC (intermittent release): 0,56 mg/l with assessment factor of 100
  - PNEC (sewage treatment plant; STP): 452 mg/l with assessment factor of 10
  - PNEC (freshwater sediments): 0,24 mg/kg sediment dw with assessment factor of N/A
  - PNEC (marine sediments): 0,02 mg/kg sediment dw with assessment factor N/A
  - PNEC (soil): 0,014683 mg/kg soil dw with assessment factor of N/A

- **Exposure controls**

  - **Personal protective equipment:**

    - **General protective and hygienic measures:**
      - Keep away from foodstuffs, beverages and feed.
      - Immediately remove all soiled and contaminated clothing.
      - Wash hands before breaks and at the end of work.
      - Avoid contact with the eyes and skin.
      - Be sure to clean skin thoroughly after work and before breaks.
      - Ensure that washing facilities are available at the work place.

    - **Respiratory protection:**
      - Use suitable respiratory protective device in case of insufficient ventilation.
      - Short term filter device:
        - Filter A/P2

    - **Protection of hands:**

      - Protective gloves

        The selected protective gloves have to satisfy the specifications of standard EN 374 or its equivalent.
        - Replace gloves immediately when torn or any change in appearance (dimension, colour, flexibility etc) is noticed.
        - The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
        - Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation.

    - **Material of gloves**
      - The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.
      - **Full Contact:**
        - Butyl rubber, BR
        - Recommended thickness of the material: \( \geq 0.7 \) mm
      - **Splash Contact:**
        - Natural latex
        - Chloroprene rubber, CR
        - PVC gloves
        - Recommended thickness of the material: \( \geq 0.5 \) mm
      - **Penetration time of glove material**
        - **Full Contact:**
          - Break through time: \( \geq 480 \) min
        - **Splash Contact:**
          - Break through time: \( \geq 30 \) min
          - The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
· Eye protection:

Safety glasses with side shields conforming to EN166, ANSI 87.1-2010, or equivalent.

Face protection

· Body protection:

Protective work clothing

The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

### 9 Physical and chemical properties

**Information on basic physical and chemical properties**

**General Information**

- **Appearance:**
  - Form: Liquid
  - Colour: Colourless
- **Odour:** Odourless
- **Odour threshold:** Not determined.
- **pH-value (100 g/l) at 20 °C:** 4-6

**Change in condition**

- **Melting point/Melting range:** ~ -43,5 °C
- **Boiling point/Boiling range:** 204-206 °C

- **Flash point:** 100-101 °C (Open Cup)

- **Flammability (solid, gaseous):** Not applicable.

- **Ignition temperature:** 445 °C

- **Decomposition temperature:** Not determined.

- **Self-igniting:** Not determined.

- **Danger of explosion:** Product does not present an explosion hazard.

- **Explosion limits:**
  - Lower: 2,7 Vol %
  - Upper: 15,6 Vol %

- **Vapour pressure at 20 °C:** >1 hPa

- **Density at 20 °C:** 1,13 g/cm³

- **Relative density** Not determined.

- **Vapour density** >3 (air=1)

- **Evaporation rate** Not determined.

- **Solubility in / Miscibility with water:** Fully miscible.

- **Partition coefficient (n-octanol/water):** Not determined.

- **Viscosity:**
  - Dynamic: Not determined.
  - Kinematic: Not determined.

- **Solvent content:**
  - Organic solvents: 99,5 %

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Safety Data Sheet
according to Globally Harmonized System (GHS)

Printing date 05.11.2014
Revision: 05.11.2014

Trade name: γ-butyrolactone (GBL)

VOC (EC)  Other information
99.50 %  No further relevant information available.

10 Stability and reactivity

· Reactivity  When properly handled and stored, no dangerous reaction is known.
· Chemical stability  This product is stable under prescribed use and storage. Sensitive to moisture.
· Thermal decomposition / conditions to be avoided:  No decomposition if used according to specifications. Heating
· Possibility of hazardous reactions  Reacts with strong acids and alkali.
· Conditions to avoid  Protect from heat. Keep ignition sources away.
· Incompatible materials:
  - Strong acids
  - Strong oxidizing agents
  - Strong bases
  - Zinc
  - various plastics
· Hazardous decomposition products:
  - Carbon monoxide (CO) and carbon dioxide (CO₂)
  - Nitrogen oxides

11 Toxicological information

· Information on toxicological effects

· Acute toxicity:  Harmful if swallowed.
· LD/LC50 values relevant for classification:

<table>
<thead>
<tr>
<th>96-48-0 gamma-butyrolactone</th>
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</thead>
<tbody>
<tr>
<td>Oral LD₅₀</td>
</tr>
<tr>
<td>Dermal LD₅₀</td>
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· Skin corrosion/irritation:
  - Not classified based on available data.
  - Rabbit: not irritating (OECD Test Guideline 404)
· Serious eye damage/eye irritation:
  - Causes serious eye damage.
  - Non-corrosive but causes irreversible eye damage.
· Respiratory or skin sensitization:
  - Not classified based on available data.
  - Mice (Local Lymph Node Assay): Not sensitizing to the skin (OECD Test Guideline 429)
· Germ Cell Mutagenicity:
  - Not classified based on available data.
  - In-vivo genotoxicity (fruit fly): negative (OECD 407)
· Carcinogenicity:
  - Not classified based on available data.
  - Mouse (oral, long-term exposure): negative (OECD Guideline N/A; NTP)
· Reproductive Toxicity:
  - Not classified based on available data.
  - Rat - Negative (OECD 414)
· Specific Target Organ Toxicity - Single Exposure (STOT SE):
  - May cause drowsiness or dizziness.
· Specific Target Organ Toxicity - Repeated Exposure (STOT RE):
  - Not classified based on available data.
12 Ecological information

- **Toxicity**
  - **Aquatic toxicity:**
    - Not classified based on available data.
    - EC50 (Daphnia Magna, 48hr): > 500 mg/L (OECD N/A; EU Method C.2)
    - ErC50 (Alga, 72hr): > 1000 mg/L (OECD N/A; DIN 38412, part 9)
    - LC50 (96hr, freshwater fish): 56 mg/L (OECD 203)

- **Persistence and degradability**
  - Easily biodegradable
  - Degradation: 77% (14d, OECD 301C)

- **Bioaccumulative potential**
  - Bioconcentration Factor (BCF): 3.16 L/kg
  - Bioaccumulation is not expected.

- **Mobility in soil**
  - Partition coefficient, soil organic carbon/water (Koc): 3.501-6.477; log Koc: 0.5442-0.8114
  - Henry's Law Constant (H): 1.84 x 10^4 Pa m^3/mol

- **Additional ecological information:**
  - **General notes:**
    - Water hazard class 1 (German Regulation) (Assessment by list): slightly hazardous for water
    - Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
  - **Other adverse effects**
    - No further relevant information available.

13 Disposal considerations

- **Waste treatment methods**
  - **Recommendation**
    - After prior treatment product has to be disposed of in an incinerator for hazardous waste adhering to the regulations pertaining to the disposal of particularly hazardous waste.
    - Must not be disposed together with household garbage. Do not allow product to reach sewage system.
    - Any disposal method should also comply with national, regional, provincial, and local laws.

- **Uncleaned packaging:**
  - **Recommendation:**
    - Empty contaminated packagings thoroughly. They may be recycled after thorough and proper cleaning.
    - Disposal must be made according to official regulations.
  - **Recommended cleansing agents:**
    - Water, if necessary together with cleansing agents.

14 Transport information

- **UN-Number**
  - **ADR, ADN, IMDG, IATA**: None (Not Regulated)
  - **UN proper shipping name**: None (Not Regulated)

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Trade name: γ-butyrolactone (GBL)

Transport hazard class(es)
- ADR, ADN, IMDG, IATA
- Class: None (Not Regulated)
- Packing group: ADR, IMDG, IATA None (Not Regulated)
- Environmental hazards:
  - Marine pollutant: No
  - Special precautions for user: Not applicable.

15 Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture

Status of global inventories:
All component(s) within this product is listed or exempted from the following country's chemical inventory:
- USA – TSCA
- Australia – AICS
- Canada – DSL
- China – IECSC
- EU – EINECS/NLP
- Japan – ENCS
- Korea – KECI
- New Zealand – NZIoC
- Philippines – PICCS
- Taiwan – ECSI
- Mexico - INSQ

Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

16 Other information

Abbreviations and acronyms:
- ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
- IMDG: International Maritime Code for Dangerous Goods
- IATA: International Air Transport Association
- EINECS: European Inventory of Existing Commercial Chemical Substances
- ELINCS: European List of Notified Chemical Substances
- CAS: Chemical Abstracts Service (division of the American Chemical Society)
- VOC: Volatile Organic Compounds (USA, EU)
- DNEL: Derived No-Effect Level (REACH)
- PNEC: Predicted No-Effect Concentration (REACH)
- LC50: Lethal concentration, 50 percent
- LD50: Lethal dose, 50 percent
- Acute Tox. 4: Acute toxicity, Hazard Category 4
- Eye Dam. 1: Serious eye damage/eye irritation, Hazard Category 1
- STOT SE 3: Specific target organ toxicity - Single exposure, Hazard Category 3

Sources
Most toxicological and eco-toxicological data are obtained from European Chemical Agency (ECHA)'s public dissemination website.
http://apps.echa.europa.eu/registered/data/dossiers/DISS-9d9e95c3-5f03-3da6-e044-00144f67d249/DISS-9d9e95c3-5f03-3da6-e044-00144f67d249.html

General Disclaimers:
DCC Group recommends that all the users/customers/recipient to study this Safety Data Sheet (SDS) carefully and understand all the data or any potential hazards associated with this product. Please consult with appropriate expert if necessary. The information herein is provided in good faith and is believed to be accurate on the date of issue. No warranty, expressed or implied, is given. It is the customer's/user's...
responsibility to ensure that they are complying with local, regional, state, provincial, and/or national laws in using this product, as regulatory requirement may differ at each level. It is also the customer’s/user’s responsibility to determine the necessary condition required for using this product safely, as actual operating or usage conditions are beyond DCC Group’s control. DCC Group will not be responsible for any SDS obtained from elsewhere other than from DCC Group. If you are unsure whether the SDS you have is current or have obtained the SDS from another source; please contact us to obtain the latest version.