

Safety Data Sheet according to Globally Harmonized System (GHS)

Printing date 2020-09-02

Revision: 2020-09-02

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

- **Product identifier**
- **Trade name: Tetrahydrofuran (THF)**
- **Synonyms:**
1.4-Epoxybutane; Diethylene oxide; Butylene oxide; Cyclotetramethylene oxide; Furanidine; Hydrofuran; Oxacyclopentane; Tetramethylene oxide
- **CAS Number:**
109-99-9
- **Relevant identified uses of the substance or mixture and uses advised against :**
- **Identified/Recommended uses:**
Intermediate for organic synthesis
Solvent
Raw Material for:
Chemical for synthesis
- **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:**
Flam. Liq. 2 H225 Highly flammable liquid and vapour.
Acute Tox. 4 H302 Harmful if swallowed.
Skin Corr. 3 H316 Causes mild skin irritation.
Eye Irrit. 2A H319 Causes serious eye irritation.
Carc. 2 H351 Suspected of causing cancer.
STOT SE 3 H335 May cause respiratory irritation.

- **Label elements:**
- **Hazard pictograms:**



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- **Signal word:** Danger
- **Hazard statements:**
Highly flammable liquid and vapour.
Harmful if swallowed.
Causes mild skin irritation.
Causes serious eye irritation.
Suspected of causing cancer.
May cause respiratory irritation.
- **Precautionary statements:**
Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
Wear protective gloves/protective clothing/eye protection/face protection.
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower].

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IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Store locked up.

Dispose of contents/container in accordance with local/regional/national/international regulations.

· **Other hazard:** None known.

3 Composition/information on ingredients

· **Chemical characterisation: Substances**

· **CAS No. Description**

109-99-9 Tetrahydrofuran >99.9%

4 First aid measures

· **Description of first aid measures**

· **General information:** Personal protection for the First Aider.

· **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:**

Do not induce vomiting; call for medical help immediately.

If vomiting occurs spontaneously, keep head below hips to prevent aspiration.

· **Most important symptoms and effects, both acute and delayed:**

Irritant effects

Coughing

Shortness of breath

Drowsiness

High concentration may cause central nervous system depression resulting in headaches, dizziness, and nausea.

· **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)

Vapours are heavier than air and may spread along floors.

Pay attention to flashback.

· **Advice for firefighters**

· **Protective equipment:**

Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves).

· **Additional information**

Cool endangered receptacles with water spray.

Do not inhale explosion gases or combustion gases.

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Avoid contact with skin, eye, and clothing.

6 Accidental release measures

Personal precautions, protective equipment and emergency procedures

Wear protective equipment. Keep unprotected persons away.

If possible, stop flow of product.

Ensure adequate ventilation

Do not breathe dust/fume/gas/mist/vapours/spray.

Use respiratory protective device against the effects of fumes/dust/aerosol.

Keep away from ignition sources.

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).

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

Handling:**Precautions for safe handling**

Wear protective gloves/protective clothing/eye protection/face protection.

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Ensure good ventilation/exhaustion at the workplace.

Open and handle receptacle with care.

Prevent formation of aerosols.

Avoid breathing vapor.

Information about fire - and explosion protection:

Normal measures for preventive fire protection.

Keep ignition sources away - Do not smoke.

Protect against electrostatic charges.

May form explosive peroxides.

Storage:**Requirements to be met by storerooms and receptacles:**

Store in cool, dry place in tightly closed receptacles.

Store in the following material(s):

Carbon steel

Further information about storage conditions:

Keep container tightly sealed.

Store in cool, dry conditions in well sealed receptacles.

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.

Technical measures and appropriate working operations should be given priority over the use of personal protective equipment.

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· **Control parameters**

· **Ingredients with limit values that require monitoring at the workplace:**

109-99-9 tetrahydrofuran	
IOELV (EU)	Short-term value: 300 mg/m ³ , 100 ppm Long-term value: 150 mg/m ³ , 50 ppm Skin
TLV (Korea)	Short-term value: 280 mg/m ³ , 100 ppm Long-term value: 140 mg/m ³ , 50 ppm Skin

· **Ingredients with biological limit values:**

109-99-9 tetrahydrofuran	
BEI (USA)	2 mg/L Medium: urine Time: end of shift Parameter: Tetrahydrofuran

· **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.
- 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:**

In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use self-contained respiratory protective device.

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.

Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation

· **Material of gloves**

Splash Contact:

Butyl rubber, BR

Recommended thickness of the material: ≥ 0.7 mm

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.

· **Penetration time of glove material**

Splash Contact:

Break through time: > 10 min

The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

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· Eye protection:


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

· Body protection:

Flame retardant antistatic protective 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: Ether-like

· Odour threshold: Not determined.

· pH-value: Not determined.

· Change in condition

Melting point/freezing point: -108.5 °C
Initial boiling point and boiling range: 66 °C

· Flash point: -17 °C

· Flammability (solid, gas): Not applicable.

· Ignition temperature: 230 °C

· Decomposition temperature: Not determined.

· Auto-ignition temperature: Not determined.

· Explosive properties: Product is not explosive. However, formation of explosive air/vapour mixtures are possible.

· Explosion limits:

Lower: 1.5 Vol %
Upper: 12 Vol %

· Vapour pressure at 20 °C: 200 hPa

· Density at 20 °C: 0.8892 g/cm³

· Relative density
20°C / 4°C: 0.887
20°C / 20°C: 0.888

· Vapour density: Not determined.

· 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.

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- **Other information** No further relevant information available.

10 Stability and reactivity

- **Reactivity:**
Vapour/air-mixtures are explosive at intense warming.
When properly handled and stored, no dangerous reaction is known.
- **Chemical stability:**
May form explosive peroxides.
This product is stable under prescribed use and storage.
Stabilizer: BHT
- **Thermal decomposition / conditions to be avoided:**
No decomposition if used according to specifications.
- **Possibility of hazardous reactions:** Possible formation of peroxide.
- **Conditions to avoid:** Warming
- **Incompatible materials:**
Oxygen.
Avoid contact with:
Aluminium, bronze, Zinc, Tin
various plastics
rubber
- **Hazardous decomposition products:** Peroxides

11 Toxicological information

- **Information on toxicological effects**
- **Acute toxicity** Harmful if swallowed.

LD/LC50 values relevant for classification:**109-99-9 tetrahydrofuran**

Oral | LD50 | 1650 mg/kg (rat)

- **Skin corrosion/irritation:**
Causes mild skin irritation.
Primary irritation index (PII): 1.93 (Draizen Test)
Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product.
Source: External (M)SDS
- **Serious eye damage/eye irritation:**
Causes serious eye irritation.
Rabbit: irritating to the eye (OECD 405)
- **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-vitro genotoxicity (mammalian cells): negative (EU Method B.17)
- **Carcinogenicity:**
Suspected of causing cancer.
Indication of possible carcinogenic effect in animal tests.
Source: US Hazardous substances data bank (HSDB) & EU Committee for Risk Assessment (RAC; Doc. No: CLH-O-000000954-69-03/A1)
- **Reproductive Toxicity:**
Not classified based on available data.
Rat - Negative (87/302/EEC)

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- **Specific Target Organ Toxicity - Single Exposure (STOT SE):**
May cause respiratory irritation.
Inhalation of vapours or mists may cause irritation to the respiratory system.
 - **Specific Target Organ Toxicity - Repeated Exposure (STOT RE):**
Not classified based on available data.
 - **Aspiration Hazard:** Not classified based on available data.
 - **Primary irritant effect:**
 - **Skin corrosion/irritation** Causes mild skin irritation.
 - **Serious eye damage/irritation** Irritating effect.
 - **Respiratory or skin sensitisation** No sensitising effects known.
 - **Data which have an impact on the following groups:**
 - **CMR effects (carcinogenicity, mutagenicity and toxicity for reproduction)**
Carc. 2
-

12 Ecological information

- **Toxicity**
 - **Aquatic toxicity:**
Not classified based on available data.
LC50 (96hr, freshwater fish): 2160 mg/L (OECD 203)
NOEC (fish, 33d): 216 mg/L (OECD N/A; other)
EC50 (Daphnia Magna, 48hr): 3485 ppm (OECD 202)
 - **Persistence and degradability**
The product is not easily, but potentially biodegradable.
Degradation : 39% (28d, OECD 301D)
 - **Bioaccumulative potential**
Bioaccumulation is not expected.
Partition coefficient, n-octanol/water (log Pow) : 1,47 @ 30 °C
 - **Mobility in soil** No further relevant information available.
 - **Additional ecological information:**
 - **General notes:**
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.
Empty containers may still contain hazardous residue.
Disposal must be made according to official regulations.
 - **Recommended cleansing agents:** Water, if necessary together with cleansing agents.
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14 Transport information

- UN-Number
- ADR, IMDG, IATA
- UN proper shipping name
- ADR
- IMDG, IATA
- Transport hazard class(es)
- ADR, IMDG, IATA

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TETRAHYDROFURAN


- Class
- Label
- Packing group
- ADR, IMDG, IATA
- Environmental hazards:
- Special precautions for user
- Hazard identification number (Kemler code):
- EMS Number:
- Stowage Category
- Transport/Additional information:

3 Flammable liquids.

3

II

Not applicable.

Warning: Flammable liquids.

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F-E,S-D

B

- ADR
- Limited quantities (LQ)
- Excepted quantities (EQ)
- Transport category
- Tunnel restriction code

1L

Code: E2

Maximum net quantity per inner packaging: 30 ml

Maximum net quantity per outer packaging: 500 ml

2

D/E

- IMDG
- Limited quantities (LQ)
- Excepted quantities (EQ)
- UN "Model Regulation":

1L

Code: E2

Maximum net quantity per inner packaging: 30 ml

Maximum net quantity per outer packaging: 500 ml

UN 2056 TETRAHYDROFURAN, 3, II

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

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Taiwan – TCSI
Mexico - INSQ
Thailand - TECI
Vietnam – NCI

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
CAS: Chemical Abstracts Service (division of the American Chemical Society)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
Flam. Liq. 2: Flammable liquids – Category 2
Acute Tox. 4: Acute toxicity - oral – Category 4
Skin Corr. 3: Skin corrosion/irritation – Category 3
Eye Irrit. 2A: Serious eye damage/eye irritation – Category 2A
Carc. 2: Carcinogenicity – Category 2
STOT SE 3: Specific target organ toxicity (single exposure) – Category 3

· Sources

Most toxicological and eco-toxicological data are obtained from European Chemical Agency (ECHA)'s public dissemination website.
<http://echa.europa.eu/registration-dossier/-/registered-dossier/15474>

· General Disclaimers:

CCP Group recommends that all the users/customers/recipients 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 CCP Group's control. CCP Group will not be responsible for any SDS obtained from elsewhere other than from CCP 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.

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