

Safety Data Sheet

according to Globally Harmonized System (GHS)

Printing date 2023-05-30

Revision: 2023-05-30

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
18th Floor, No. 223 Songjiang Rd., Zhongshan District
104072, Taipei, Taiwan
Tel: +886-2-7752-2800 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:**
3E Global Incident Response Hotline 24h (Access Code 336088):
Americas: +1 760 476 3961
Asia-Pacific: +1 760 476 3960
Europe: +1 760 476 3962
Middle East/Africa: +1 760 476 3959
Non-Region Specific: +1 760 476 3971

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.
Serious eye damage/irritation – Category 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:**



GHS02 GHS07 GHS08

- **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.

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· 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].

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

Store in a well-ventilated place. Keep container tightly closed.

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:**

Immediately remove any clothing soiled by the product.

Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.

Personal protection for the First Aider.

· After inhalation: Supply fresh air; consult doctor in case of complaints.**· After skin contact:**

Immediately rinse with water.

If skin irritation continues, consult a doctor.

· After eye contact:

Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.

Rinse opened eye for 15 minutes under running water. If symptom persists consult a doctor.

· After swallowing:

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

Do not induce vomiting; call for medical help immediately.

Call for a doctor immediately.

· 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:** Use fire extinguishing methods suitable to surrounding conditions.**· For safety reasons unsuitable extinguishing agents:** No information available.**· Special hazards arising from the substance or mixture**

Carbon monoxide (CO)

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Carbon dioxide (CO₂)

Vapours are heavier than air and may spread along floors.

Pay attention to flashback.

Combustible.

· Advice for firefighters**· Protective equipment:**

Wear self-contained respiratory protective device.

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.

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.

Dispose contaminated material as waste according to section 13.

· 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.

Use personal protective equipment as required.

· 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:**· Conditions for safe storage, including any incompatibilities**

Store in the following material(s):

Carbon steel

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- Store in a cool location.
- Store in cool, dry place in tightly closed receptacles.
- **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.

- **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
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- **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:**
- 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.

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

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Material of gloves

Splash Contact:

Butyl rubber, BR

Recommended thickness of the material: ≥ 0.4 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.

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.

Melting point/freezing point:

-108.5 °C

Initial boiling point and boiling range:

66 °C

Flash point:

-17 °C

Evaporation rate

Not determined.

Flammability (solid, gas):

Not applicable.

Auto-ignition temperature:

230 °C

Decomposition temperature:

Not determined.

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

Not determined.

20 °C / 4 °C: 0.887

20 °C / 20 °C: 0.888

Vapour density

Not determined.

Evaporation rate

Not determined.

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- **Solubility in / Miscibility with water:** Fully miscible.
- **Partition coefficient: n-octanol/water:** Not determined.
- **Viscosity:** No information available.
 - **Dynamic:** Not determined.
 - **Kinematic:** Not determined.

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:**
No dangerous reactions known.
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)
Sensitising to the respiratory system.
- **Germ Cell Mutagenicity:**
Not classified based on available data.
In-vitro genotoxicity (mammalian cells): negative (EU Method B.17)

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- **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-0000000954-69-03/A1)
- **Reproductive Toxicity:**
Not classified based on available data.
Rat - Negative (87/302/EEC)
- **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.
- **Subacute to chronic toxicity:**
- **CMR effects (carcinogenity, mutagenicity and toxicity for reproduction)**
Carc. 2
発がん性 区分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 Kow) : 0.45 @ 25 °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.

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

14 Transport information

- **UN-Number**
- **ADR, IMDG, IATA** UN2056
- **UN proper shipping name**
- **ADR** 2056 TETRAHYDROFURAN
- **IMDG, IATA** TETRAHYDROFURAN
- **Transport hazard class(es)**
- **ADR, IMDG, IATA**



- **Class** 3 Flammable liquids.
- **Label** 3
- **Packing group**
- **ADR, IMDG, IATA** II
- **Environmental hazards:** Not applicable.
- **Special precautions for user** Warning: Flammable liquids.
- **Hazard identification number (Kemler code):** 33
- **EMS Number:** F-E,S-D
- **Stowage Category** B

· Transport/Additional information:

- **ADR**
- **Limited quantities (LQ)** 1L
- **Excepted quantities (EQ)** Code: E2
Maximum net quantity per inner packaging: 30 ml
Maximum net quantity per outer packaging: 500 ml
- **Transport category** 2
- **Tunnel restriction code** D/E

- **IMDG**
- **Limited quantities (LQ)** 1L
- **Excepted quantities (EQ)** Code: E2
Maximum net quantity per inner packaging: 30 ml
Maximum net quantity per outer packaging: 500 ml
- **UN "Model Regulation":** UN 2056 TETRAHYDROFURAN, 3, II

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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 – TCSI
Mexico - INSQ
Thailand - TECI
Vietnam – NCI

16 Other information

- **Abbreviations and acronyms:**
ADR: Accord relatif au transport international 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 – Category 4
Skin Corr. 3: Skin corrosion/irritation – Category 3
Serious eye damage/irritation – Category 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.
厚生労働省GHSモジュール・SDS情報
<http://echa.europa.eu/registration-dossier/-/registered-dossier/15474>
NITE 化学物質総合情報提供システム (NITE-CHRIP)
厚生労働省GHS SDS情報
- **General Disclaimers:**
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