

TETRAHYDROFURAN

1. IDENTIFICATION

A. Product name:

TETRAHYDROFURAN

B. Recommended use of the chemical and restrictions on use:

Recommended use : No Data Available

Restrictions on use : No Data Available

C. Information of manufacturer, supplier:

Company:

SK GlobalChemical Co.,Ltd.

Address:

Head office) 99, Seorin-dong, Jongno-gu, Seoul, Korea.

Factory) 110, Gosa-dong, Nam-gu, Ulsan, Korea.

Laboratory)325, Exporo, Yuseong-gu, Daejeon.

Emergency Telephone No:

82-42-609-8943

2. HAZARD IDENTIFICATION

A. Classification:

Flammable liquids : 2

Acute Toxicity-Oral : 4

Skin corrosion/irritation : 2

Eye Damage/Irritation : 2A

Carcinogenicity : 2

Specific target organ toxicity(single exposure) : 2

Specific target organ toxicity(single exposure) : 3

Specific target organ toxicity(repeated exposure) : 1

B. Label element, including precautionary statements:

Symbols:



Signal word(s):

Danger

○ Hazard statement(s):

- H225: Highly flammable liquid and vapour
- H302: Harmful if swallowed
- H315: Causes skin irritation
- H319: Causes serious eye irritation
- H335: May cause respiratory irritation
- H351: Suspected of causing cancer.
- H371: May cause damage to organs. Central Nervous system, Ear, Kidney, Liver.
- H372: May cause damage to organs through prolonged or repeated exposure. Central Nervous system, Ear

○ Precautionary statement(s):

⊙ Prevention

- P201: Obtain special instructions before use.
- P202: Do not handle until all safety precautions have been read and understood.
- P210: Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
- P233: Keep container tightly closed.
- P240: Ground/bond container and receiving equipment.
- P241: Use explosion-proof electrical, ventilating, lighting equipment.
- P242: Use only non-sparking tools.
- P243: Take precautionary measures against static discharge.
- P260: Do not breathe dust/fume/gas/mist/vapours/spray.
- P261: Avoid breathing dust/fume/gas/mist/vapours/spray.
- P264: Wash skin thoroughly after handling.
- P270: Do not eat, drink or smoke when using this product.
- P271: Use only outdoors or in a well-ventilated area.
- P280: Wear protective gloves/protective clothing/eye protection/face protection.
- P282: Wear cold insulating gloves/face shield/eye protection.

⊙ Response

- P301+P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
- P302+P352: IF ON SKIN: Wash with plenty of soap and water.
- P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
- P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P308+P313: IF exposed or concerned: Get medical advice/attention.
- P309+P311: IF exposed or if you feel unwell: Call a POISON CENTER or doctor/physician.
- P312: Call a POISON CENTER or doctor/physician if you feel unwell.
- P314: Get medical advice/attention if you feel unwell.
- P321: Specific treatment (see details on label).
- P330: Rinse mouth.
- P332+P313: If skin irritation occurs: Get medical advice/attention.
- P337+P313: If eye irritation persists: Get medical advice/attention.
- P362: Take off contaminated clothing and wash before reuse.
- P370+P378: Use water fog, foam, dry chemical or carbon dioxide (CO₂) to extinguish.

⊙ Storage

- P403+P233: Store in a well-ventilated place. Keep container tightly closed.
- P405: Store locked up.

⊙ Disposal

- P501: Dispose of contents/container to (in accordance with local/regional/national/international regulation).

C. Other hazards which do not result in classification:

- NFPA grade (0 ~ 4 level)
- Health : 2 , Flammability : 3, Reactivity : 1

D. Classification of the substance or mixture
3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical identity	Common name, synonym	CAS number	Percentages(%)
Tetrahydrofuran	Tetramethylene Oxide	109-99-9	> 99.9 %

The Others

4. FIRST AID MEASURES
A. Eye contact:

Wash eyes for at least 15 minutes with plenty of water.
Consult with a doctor.

B. Skin contact:

Wash eyes for at least 15 minutes with soap and water.
If irritation or symptoms occur, consult with a doctor.
Rinse contaminated clothing before reuse.
Remove contaminated clothing and shoes.

C. Inhalation:

Avoid exposure from sources.
Do artificial respiration if needed.
Get medical attention.

D. Ingestion:

Contact local poison control center or physician immediately.
Never make an unconscious person vomit or drink fluids.
When vomiting occurs, keep head lower than hips to help prevent aspiration.
If person is unconscious, turn head to side.
Get medical attention immediately.

E. Most important symptoms/effect, acute and delayed:

- Inhale
 - Short time exposure : Irritation, blood pressure, vomit, headache, sleepiness, function loss suffocation, insensibility.
 - Long time exposure : Irritation, nosebleed, liner trouble, genital influence, brain trouble, insesibility.
- Intake
 - Short time exposure : Irritation, nausea, vomit, diarrhea, stomachache.
 - Long time exposure : kidney trouble, liner trouble.
- Skin contact
 - Short time exposure : Irritation.
 - Long time exposure : Irritation.
- Eyes contact

- Short time exposure : Irritation, tearjacker.
- Long time exposure : Visual impairment.

F. Indication of immediate medical attention and special treatment needed, if necessary:

When person intakes, consider stomach pump and activate carbon slurry inject.

5. FIRE-FIGHTING MEASURES**A. Suitable extinguishing media:**

- Suitable extinguishing media : Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
- Inappropriate extinguishing media : -
- Major fire : Use alcohol formal or big water sprinke by fine spray.

B. Specific hazards arising from the chemical:

- Heat decomposition product : Carbon oxide
- Fire and explosion risk : Serious fire risk. The mixture of vapour and air is explosive. Vapour is havier than air. Vapour or gas can ignite from distant fire source and spread rapidly.

C. Special protective equipment and precautions for firefighters:

Move container from fire area if it can be done without risk.
Cool Containers with water spray until well after the fire is out.
Stay away from the ends of tanks.
For fires in cargo or storage area : Cool Containers with water from unmanned hose holder or monitor nozzles until well after fire is out.
If this is impossible then take the following precautions : Keep unnecessary people away, isolate hazard area and deny entry.
Let the fire burn.
Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire.
For tank, rail car or tank truck: Evacuation radius : 800 meters

6. ACCIDENTAL RELEASE MEASURES**A. Personal precautions, protective equipment and emergency procedures:**

Use personal protective equipment.
Avoid breathing vapors, mist or gas.
Ensure adequate ventilation.
Remove all sources of ignition.
Evacuate personnel to safe areas.
Beware of vapours accumulating to form explosive concentrations.
Vapours can accumulate in low areas.

B. Environmental precautions:

Prevent further leakage or spillage if safe to do so.
Do not let product enter drains.

C. Methods and materials for containment and cleaning up:

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

7. HANDLING AND STORAGE

A. Precautions for safe handling:

Avoid contact with skin and eyes.
Avoid inhalation of vapour or mist.
Use explosion-proof equipment.
Keep away from sources of ignition – No smoking.
Take measures to prevent the build up of electrostatic charge.

B. Conditions for safe storage, including incompatibilities:

Keep container tightly closed in a dry and well-ventilated place.
Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION**A. Exposure limits in the air of the workplace, biological limit values:**

- Domestic regulation
 - TWA : 50 ppm 140 mg/m³
 - STEL : 100 ppm 280 mg/m³
- ACGIH regulation
 - TWA : 200 ppm 590 mg/m³
 - STEL : 250 ppm 735 mg/m³
- Biological exposure limits
 - No Data Available

B. Appropriate engineering controls:

Install ventilation equipment.
Ensure compliance with applicable exposure.
Ventilation equipment should be explosion-resistant type if explosive concentrations of material are present.

C. Individual protection measures: **Respiratory protection:**

Where risk assessment shows air-purifying, respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls.

If the respirator is the sole means of protection, use a full-face supplied air respirator.

Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

 Eye protection:

Tightly fitting safety goggles.
Faceshield (8-inch minimum).

Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Provide an emergency eye wash foundation and quick drench shower in the immediate work area.

 Hand protection:

Handle with gloves.

Gloves must be inspected prior to use.

Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product.

Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

○ **Body protection:**

Complete suit protecting against chemicals.

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

A. Appearance (physical state, colour etc):

Physical state – Liquid

Colour – Achromatic color

B. Odour:

Sweet Smell

C. Odour threshold:

No Data Available

D. pH:

No Data Available

E. Melting point/freezing point:

-108 °C

F. Initial boiling point and boiling range:

66 °C

G. Flash point:

-14 °C

H. Evaporation rate:

No Data Available

I. Flammability(solid, gas) :

No Data Available

J. Upper/lower flammability or explosive limits:

11.8/ 2 %

K. Vapour pressure:

19.3 kPa (20 °C)

L. Solubility(ies):

100 g/ 100 ml (Water)

M. Vapour density:

2.49

N. Specific gravity:

0.8892 (20 °C/4 °C)

O. Partition coefficient: n-octanol/water:

0.46 (= log Pow (Measurements))

P. Auto-ignition temperature:

321 °C

Q. Decomposition temperature:

No Data Available

R. Viscosity:

0.53 cP (20 °C)

10. STABILITY AND REACTIVITY**A. Chemical stability:**

Explosive peroxides can be produced.
Avoid with Long-term storage/air and light contact or storage and use above room temperature.

B. Possibility of hazardous reactivity:

Polymerization : Polymerizes with exothermic reaction. Avoid contact with heat or acids or amines.

C. Conditions to avoid:

Avoid contact with heat, flames, sparks and other sources of ignition sparks.
If container is exposed to heat, containers may rupture or explode.

D. Incompatible materials:

Acids, bases, halogens, metals, oxidizing materials, combustible materials, metal oxide.

E. Hazardous decomposition products:

Hazardous decomposition products formed under fire conditions. – Carbon oxides

11. TOXICOLOGICAL INFORMATION**A. Information on the likely routes of exposures:****○ Inhalation exposure:**

May be harmful if inhaled.
Causes respiratory tract irritation.

Vapours may cause drowsiness and dizziness.

Ingestion exposure:

Harmful if swallowed.

Skin exposure:

Harmful if absorbed through skin.

Causes skin irritation.

Eye exposure:

Causes eye irritation.

B. Delayed and immediate effects and also chronic effects from short and long term exposure:

Acute toxicity:

– Oral

LD50 rat : 1,650 mg/kg

LD50 guinea pig : 2,300 mg/kg

– Dermal

LD50 rat : > 2,000 mg/kg

– Inhalation

LC50 rat : 3 h – 21,000 ppm

Remarks : Drowsiness

Lungs, Thorax, or Respiration : Respiratory stimulation.

Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

Skin corrosion/irritation:

rabbit – Mild skin irritation – Draize Test

Serious eye damage/irritation:

rabbit – Risk of serious damage to eyes – Draize Test

Respiratory sensitization:

mouse – Did not cause sensitization on laboratory animals.

Skin sensitization:

Skin sensitizing effects were not observed in animal studies.

Carcinogenicity:

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.

NTP – No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA – No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

ACGIH – A3

EU CLP – 2

Germ cell mutagenicity:

In vivo tests did not show mutagenic effects.

Reproductive toxicity:

The effect on reproductive function and reproductive capacity by rats is not reported.

Specific target organ systemic toxicity—single exposure:

Coma, cramps and shortness of breath in rats appear.
May cause drowsiness or dizziness. – Nervous system
May cause respiratory irritation.

Specific target organ systemic toxicity—repeated exposure:

Kidney failure, liver failure and central nervous convulsion in humans is reported.

Aspiration hazard:

No aspiration toxicity classification.

C. Numerical measures of toxicity(such as acute toxicity estimate):

No Data Available

12. ECOLOGICAL INFORMATION

A. Aquatic, terrestrial organisms toxicity:

Fish : LC50 – Pimephales promelas (fathead minnow) – 2,160 mg/l – 96 h
Algae : Growth inhibition NOEC – Algae – 3,700 mg/l – 192 h
Bird : No Data Available

B. Persistence and degradability:

Persistence : No Data Available
Degradability : No Data Available

C. Bioaccumulative potential:

Accumulation : No Data Available
Biodegradation : No Data Available

D. Mobility in soil:

No Data Available

E. Other adverse effects:

No Data Available

13. DISPOSAL CONSIDERATIONS

A. Disposal methods:

Dispose in accordance with all applicable regulations.
Waste disposal regulation in the United States = U.S.EPA 40 CFR 262.
Hazardous waste number(s) = U213.

B. Disposal considerations(Specify disposal container and methods):

Consider notices of regulations in case that it is indicated in waste disposal regulation.

14. TRANSPORT INFORMATION**A. UN Number:**

2056

B. UN Proper Shipping Name:

Tetrahydrofuran

C. Transport hazard class(es):

3

D. Packing group, if applicable:

II

E. Environmental hazards:

No Data Available

F. Special precautions for user:

Emergency measures in case of fire : F-E

Emergency measures in the effluent : S-D

15. REGULATORY INFORMATION**A. Safety, health and environmental regulations specific for the product in question:**

- Industrial Safety and Health Act : Follow the laws of your country
- Toxic Chemicals Control Act : No Data Available
- Safety Control of Dangerous Substances Act : Follow the laws of your country
- Waste management Act : No Data Available
- Other requirements in domestic and other
 - Domestic regulation : Not Applicable
- Persistent Organic Pollutants Management Act : Not Applicable
 - Foreign regulation
- American Management Information (OSHA Regulation) : Not Applicable
- American Management Information (CERCLA Regulation) : 453.599 kg 1000 lb
- American Management Information (EPCRA 302 Regulation) : Not Applicable
- American Management Information (EPCRA 304 Regulation) : Not Applicable
- American Management Information (EPCRA 313 Regulation) : Not Applicable
- American Management Information (Rotterdam Convention material) : Not Applicable
- American Management Information (Stockholm Convention material) : Not Applicable
- American Management Information (Montreal Protocol material) : Not Applicable
- EU classification Information (Final classification results) : F R11-19 Xi R36/37
- EU classification Information (Risk statement) : R11, R19, R36/37
- EU classification Information (Safety statement) : S2, S16, S29, S33

16. OTHER INFORMATION

A. References and sources for data:

- (1) SAX (8th, 1992)
- (2) NFPA (12th, 1997) p.49-126
- (3) Howard (1997)
- (4) Merck (Access on May 2005)
- (5) Renso (3rd, 1986)
- (6) ACGIH (7th 2001)
- (7) ACGIH (2006)
- (8) NTP (1998)
- (9) ACGIH (7th 2001)
- (10) IUCLID (2000)
- (11) ACGIH (7th 2005)
- (12) SITTIG (47th 2002)
- (13) ICSC (1997)
- (14) HSDB(2005)
- (15) HSFS (1997)
- (16) PHYSPROP Database (2005)

B. Originated date:

2017-04-18

C. Revision number and date:

Revision number – 0
Revision date – 0