



Scentinel® TB Gas Odorant

Version 2.3

Revision Date 2023-03-09

MSDS number: AA00974-0000000280

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

Product Name : Scentinel® TB Gas Odorant
 Material : 1119678, 1086437, 1086436, 1103087, 1103086, 1103855,
 1024798, 1024799

Recommended use of the product : Odorant
 Restrictions on use : None known.

Address : Chevron Phillips Chemical Company LP
 Specialty Chemicals
 10001 Six Pines Drive
 The Woodlands, TX 77380

Address : CHEVRON PHILLIPS CHEMICALS ASIA PTE. LTD.
 C/O DONG WOO CORPORATION
 #B-2601,JEONGJAIL-RO,
 BUNDANG-GU,SEONGNAMI-SI,
 GYEONGGI-DO,13557
 SOUTH KOREA
 Telephone no.: +612-9186-1132

Emergency telephone:

Health:

866.442.9628 (North America)

1.832.813.4984 (International)

Transport:

CHEMTREC 800.424.9300 or 703.527.3887(int'l)

Asia: CHEMWATCH (+612 9186 1132) China: 0532 8388 9090

Mexico CHEMTREC 01-800-681-9531 (24 hours)

South America SOS-Cotec Inside Brazil: 0800.111.767 Outside Brazil: +55.19.3467.1600

Argentina: +(54)-1159839431

EUROPE: BIG +32.14.584545 (phone) or +32.14583516 (telefax)

Austria: VIZ +43 1 406 43 43 (24 hours/day, 7 days/week)

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Belgium: 070 245 245 (24 hours/day, 7 days/week)
 Bulgaria: +359 2 9154 233
 Croatia: +3851 2348 342 (24 hours/day, 7 days/week)
 Cyprus: 1401
 Czech Republic: Toxicological Information Center +420 224 919 293, +420 224 915 402
 Denmark: Danish Poison Center (Gifftlinjen): +45 8212 1212
 Estonia: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
 Finland: 0800 147 111 09 471 977 (24 hours/day)
 France: ORFILA number (INRS): + 33 (0) 1 45 42 59 59 (24 hours/day, 7 days/week)
 Germany: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
 Greece: (0030) 2107793777 (24 hours/day, 7 days/week)
 Hungary: +36-80-201-199 (24 hours/day, 7 days/week)
 Iceland: 543 2222 (24 hours/day, 7 days/week)
 Ireland: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
 Italy: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
 Latvia: State Fire and Rescue Service, phone number: 112; Toxicology and Sepsis Clinic
 Poisoning and Drug Information Center, Hipokrāta 2, Riga, Latvia, LV-1038, phone number +371
 67042473. (24 hours.)
 Liechtenstein: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
 Lithuania: +370 (85) 2362052
 Luxembourg: (+352) 8002 5500 (24 hours/day, 7 days/week)
 Malta: +356 2395 2000
 The Netherlands: NVIC: +31 (0)88 755 8000
 Norway: 22 59 13 00 (24 hours/day, 7 days/week)
 Poland: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
 Portugal: CIAV phone number: +351 800 250 250
 Romania: +40213183606
 Slovakia: +421 2 5477 4166
 Slovenia: Phone number: 112
 Spain: National Emergency Telephone Number of Spanish Poison Centre: +34 91 562 04 20 (24
 hours/day, 7 days/week)
 Sweden: 112 – ask for Poisons Information

Responsible Department : Product Safety and Toxicology Group
 E-mail address : SDS@CPChem.com
 Website : www.CPChem.com
 Appointees : 회사명: 리이치 24 시코리아(주).

주소: 서울시 서초구 현릉로 7,
 외국기업창업지원연구센터
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ODOR-FADE WARNING

A GAS LEAK CAN CAUSE A FIRE OR EXPLOSION RESULTING IN SERIOUS INJURY OR DEATH.

Be aware that the stenching chemical added to gas to make it detectable may not warn of a gas leak or the presence of propane or natural gas to all persons in every instance.

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Instances where the odorant in an odorized gas may be undetectable include:

- Odor intensity may fade or be eliminated for a variety of chemical and physical causes, including the oxidation of rusting pipes, adsorption into or sticking onto the interior of pipes or appliances, or absorption into liquids.
- Contact with soil in underground leaks may de-odorize or remove odorant from the gas.
- Some people have a diminished ability, or inability to smell the stench. Factors that negatively affect a person's sense of smell include age, gender, medical conditions, and alcohol/tobacco usage.
- The stench of odorized gas may not awaken sleeping persons.
- Other odors may mask or hide the stench.
- Exposure to the odor for even a short period of time, may cause nasal fatigue, where a person can no longer smell the stench.

Gas detectors listed by the Underwriters Laboratories (UL) can be used as an extra measure of safety for detecting gas leaks, especially under conditions where the odorant alone may not provide an adequate warning. Gas detectors emit a loud, shrill sound when gas is present and do not depend on sense of smell. Because the odor intensity can fade or people may have problems with their sense of smell, we recommend installing, per manufacturer's instructions, one or more combustible gas detectors, in suitable locations to ensure adequate coverage to detect gas leaks.

Educate yourself, your employees, and your customers with the content of this warning and other important facts associated with the so-called "odor-fade phenomenon."

SECTION 2: Hazards identification**Hazard classification**

Standards for classification and labeling of chemical substances and material safety data sheet (ministry of employment and labor public notice No. 2020-130)

Classification

- : Flammable liquids, Category 2
- Skin corrosion/irritation, Category 2
- Serious eye damage/eye irritation, Category 2
- Skin sensitization, Category 1
- Aspiration hazard, Category 2
- Long-term (chronic) aquatic hazard, Category 2

Warning label elements including precautionary statements

Symbol(s)



Signal Word

: Danger

Hazard Statements

: H225: Highly flammable liquid and vapor.
H305: May be harmful if swallowed and enters airways.

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H315: Causes skin irritation.
 H317: May cause an allergic skin reaction.
 H319: Causes serious eye irritation.
 H411: Toxic to aquatic life with long lasting effects.

Precautionary Statements**: Prevention:**

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.
 P261: Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
 P264: Wash the contact area thoroughly after handling.
 P273: Avoid release to the environment.
 P280: Wear protective gloves/ eye protection/ face protection.

Response:

P301 + P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
 P303 + P361 + P353: IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
 P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
 P321: Specific treatment (see supplemental first aid instructions on this label).
 P331: Do NOT induce vomiting.
 P333 + P313: If skin irritation or rash occurs: Get medical advice/ attention.
 P337 + P313: If eye irritation persists: Get medical advice/ attention.
 P362 + P364: Take off contaminated clothing and wash it before reuse.
 P370 + P378: In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
 P391: Collect spillage.

Storage:

P403 + P235: Store in a well-ventilated place. Keep cool.

Disposal:

P501: Dispose of contents and container according to wastes control act.

Other hazards which do not result in classification : None

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SECTION 3: Composition/information on ingredients

Synonyms : Scentinel® T-70 Gas Odorant

Molecular formula : Mixture

Common name	Synonyms	CAS-No.	Concentration	KECI Number
Tetrahydrothiophene	tetrahydrothiophene	110-01-0	70%	KE-33509
t-Butyl Mercaptan	2-methylpropane-2-thiol	75-66-1	30%	KE-24873
Tetrahydrothiophene	tetrahydrothiophene	110-01-0	70%	KE-33509
t-Butyl Mercaptan	2-methylpropane-2-thiol	75-66-1	30%	KE-24873

SECTION 4: First aid measures

General advice : Move out of dangerous area. Show this material safety data sheet to the doctor in attendance. Material may produce a serious, potentially fatal pneumonia if swallowed or vomited.

In case of eye contact : Immediately flush eye(s) with plenty of water. Remove contact lenses. Protect unharmed eye. Keep eye wide open while rinsing. If eye irritation persists, consult a specialist.

In case of skin contact : If skin irritation persists, call a physician. If on skin, rinse well with water. If on clothes, remove clothes.

If inhaled : If unconscious, place in recovery position and seek medical advice. If symptoms persist, call a physician.

If swallowed : Keep respiratory tract clear. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician. Take victim immediately to hospital.

Other cautions for Doctors

Symptoms : No information available.
No data available.

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Risks : No information available.
No data available.

Treatment : No information available.
No data available.

SECTION 5: Firefighting measures

Flash point : >-17.8°C (>-0.0°F)
Method: Tagliabue Open Cup

Autoignition temperature : No data available

Suitable extinguishing media : Alcohol-resistant foam. Carbon dioxide (CO2). Dry chemical.

Unsuitable extinguishing media : High volume water jet.

Specific hazards during fire fighting : Do not allow run-off from fire fighting to enter drains or water courses.

Special protective equipment for fire-fighters : Wear self-contained breathing apparatus for firefighting if necessary.

Further information : Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. For safety reasons in case of fire, cans should be stored separately in closed containments. Use a water spray to cool fully closed containers.

Fire and explosion protection : Do not spray on a naked flame or any incandescent material. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use only explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition.

Hazardous decomposition products : Carbon oxides. Sulfur oxides.

SECTION 6: Accidental release measures

Personal precautions : Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.

Environmental precautions : Prevent product from entering drains. Prevent further leakage

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or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.

Methods for cleaning up : Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

SECTION 7: Handling and storage**Handling**

Advice on safe handling : Avoid formation of aerosol. Do not breathe vapors/dust. Avoid exposure - obtain special instructions before use. Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. Take precautionary measures against static discharges. Provide sufficient air exchange and/or exhaust in work rooms. Open drum carefully as content may be under pressure. Dispose of rinse water in accordance with local and national regulations. Persons susceptible to skin sensitization problems or asthma, allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used.

Advice on protection against fire and explosion : Do not spray on a naked flame or any incandescent material. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use only explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition.

Secure storage

Requirements for storage areas and containers : No smoking. 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. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.

Uses advised against : None known.

Specific Use : Odorant

SECTION 8: Exposure controls/personal protection**Chevron Phillips Chemical Company LP**

Components	Basis	Value	Control parameters	Note
t-Butyl Mercaptan	Manufacturer	TWA	0.5 ppm,	
	Manufacturer	TWA	0.5 ppm,	

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Components	Basis	Value	Control parameters	Note
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Chemical exposure standards, biological exposure standards, etc.

Adequate ventilation to control airborne concentrations below the exposure guidelines/limits. Consider the potential hazards of this material (see Section 2), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

Personal protective equipment

- Respiratory protection : If ventilation or other engineering controls are not adequate to maintain minimal oxygen content of 19.5% by volume under normal atmospheric pressure, a supplied-air NIOSH approved respirator may be appropriate. If exposure to harmful levels of airborne material may occur, a NIOSH approved respirator that provides protection may be appropriate, such as: Air-Purifying Respirator for Organic Vapors. Full-Face Air-Purifying Respirator for Organic Vapors, Dusts and Mists. A positive pressure, air-supplying respirator may be appropriate if there is potential for uncontrolled release, aerosolization, exposure levels are not known, or other circumstances where air-purifying respirators may not provide adequate protection.
- Eye protection : Eye wash bottle with pure water. Tightly fitting safety goggles.
- Hand protection : The suitability for a specific workplace should be discussed with the producers of the protective gloves. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.
- Skin and body protection : Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. Wear as appropriate: Remove and wash contaminated clothing before re-use. Skin should be washed after contact. Footwear protecting against chemicals.
- Hygiene measures : When using do not eat or drink. When using do not smoke. Wash hands before breaks and at the end of workday.

SECTION 9: Physical and chemical properties**Information on basic physical and chemical properties**

Appearance

- Physical state : liquid
 Color : Colorless
 Odor : Pungent

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Odor Threshold	: No data available
pH	: Not applicable
Melting point/freezing point	: No data available
Pour point	No data available
Boiling point/boiling range	: 85°C (185°F)
Flash point	: >-17.8°C (>-0.0°F) Method: Tagliabue Open Cup
Evaporation rate	: No data available
Flammability (solid, gas)	: No data available
Lower explosion limit	: No data available
Upper explosion limit	: No data available
Vapor pressure	: 20.00 mbar at 20°C (68°F) 3.60 PSI at 50°C (122°F)
Solubility	: Insoluble
Relative density	: 0.94 at 15.6 °C (60.1 °F)
Vapor density	: 3.04 (Air = 1.0)
Partition coefficient: n-octanol/water	: No data available
Autoignition temperature	: No data available
Viscosity, kinematic	: No data available
Molecular weight	: Not applicable

SECTION 10: Stability and reactivity

Reactivity : Stable under recommended storage conditions.

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Chemical stability : This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Possibility of hazardous reactions

Hazardous reactions : Hazardous reactions: Hazardous polymerization does not occur.

Hazardous reactions: Vapors may form explosive mixture with air.

Conditions to avoid : Heat, flames and sparks.

Hazardous decomposition products : Carbon oxides
Sulfur oxides

Other data : No decomposition if stored and applied as directed.

SECTION 11: Toxicological information**Information on exposure routes****Scentinel® TB Gas Odorant**

Acute oral toxicity : Acute toxicity estimate: 2,264 mg/kg
Method: Calculation method

Acute toxicity estimate: > 2,000 mg/kg
Method: Calculation method

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Acute inhalation toxicity : Acute toxicity estimate: 32.29 mg/l
Exposure time: 4 h
Test atmosphere: vapor
Method: Calculation method

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Acute dermal toxicity : Acute toxicity estimate: > 2,000 mg/kg
Method: Calculation method

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Skin corrosion or irritation : Skin irritation
largely based on animal evidence.

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Eye corrosion or irritation : Eye irritation
largely based on animal evidence.

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Respiratory Sensitization : The product is a skin sensitizer, sub-category 1B.

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Skin sensitization**

May cause an allergic skin reaction., largely based on animal evidence

Repeated dose toxicity

Tetrahydrothiophene

: Species: Rat, Male and female
Sex: Male and female
Application Route: Inhalation
Dose: 0, 51, 236, 1442 ppm
Exposure time: 13 wk
Number of exposures: 6 h/d, 5 d/wk
NOEL: 51 ppm
Method: OECD Guideline 413
Target Organs: Upper respiratory tract

t-Butyl Mercaptan

Species: Rat, Male and female
Sex: Male and female
Application Route: Inhalation
Dose: 9, 97, 196 ppm
Exposure time: 13 wks
Number of exposures: 6 hrs/d, 5 d/wk
NOEL: > 196 ppm

Species: Rat, Male and female
Sex: Male and female
Application Route: oral gavage
Dose: 10, 50, 200 mg/kg bw/day
Exposure time: 42-53 days
Number of exposures: Daily
NOEL: 50 mg/kg bw/day
Lowest observable effect level: 200 mg/kg bw/day
Method: OECD Guideline 422

Species: Rat, Male and female
Sex: Male and female
Application Route: Inhalation
Dose: 25.1, 99.6, 403.4 ppm
Exposure time: 13 wks
Number of exposures: 6 hrs/d, 5 d/wk
NOEL: 99.6 ppm
Lowest observable effect level: 403.4 ppm
Method: OECD Guideline 413
Target Organs: Liver, Kidney, Blood, Upper respiratory tract
Information given is based on data obtained from similar substances.

Germ cell mutagenicity (in vitro)

Tetrahydrothiophene

: Test Type: Ames test

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t-Butyl Mercaptan

Method: Mutagenicity (Escherichia coli - reverse mutation assay)
Result: negative

Test Type: Cytogenetic assay
Result: negative

Test Type: HGPRT assay
Result: negative

Test Type: Sister Chromatid Exchange Assay
Method: OECD Guideline 473
Result: negative

Test Type: Unscheduled DNA synthesis assay
Result: negative

Test Type: Ames test
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative

Test Type: Mouse lymphoma assay
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative

Test Type: Sister Chromatid Exchange Assay
Metabolic activation: with and without metabolic activation
Result: negative

Germ cell mutagenicity (in vivo)

t-Butyl Mercaptan : Test Type: Mouse micronucleus assay
Species: Mouse
Dose: 1250, 2500, 5000 mg/kg
Method: OECD Test Guideline 474
Result: negative

Developmental Toxicity

Tetrahydrothiophene : Species: Rat
Application Route: Inhalation
Dose: 234, 782, 1910 ppm
Method: OECD Guideline 414
NOAEL Teratogenicity: 1910 ppm
NOAEL Maternal: 234 ppm
No adverse effects expected

t-Butyl Mercaptan : Species: Mouse
Application Route: Inhalation
Dose: 11, 99, 195 ppm
Exposure time: GD 6-16

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	<p>Number of exposures: 6 hrs/d NOAEL Teratogenicity: > = 195 ppm NOAEL Maternal: > = 195 ppm</p> <p>Species: Rat Application Route: Inhalation Dose: 11, 99, 195 ppm Exposure time: GD6-19 Number of exposures: 6 hrs/d NOAEL Teratogenicity: > =195 ppm NOAEL Maternal: > = 195 ppm</p> <p>Species: Rat Application Route: oral gavage Dose: 10, 50, 200 mg/kg bw/day Exposure time: 42-53 days Number of exposures: Daily NOAEL Teratogenicity: 50 mg/kg bw /day NOAEL Maternal: 200 mg/kg bw /day</p>
Tetrahydrothiophene	<p>Species: Rat Application Route: Inhalation Dose: 234, 782, 1910 ppm Method: OECD Guideline 414 NOAEL Teratogenicity: 1910 ppm NOAEL Maternal: 234 ppm No adverse effects expected</p>
t-Butyl Mercaptan	<p>Species: Mouse Application Route: Inhalation Dose: 11, 99, 195 ppm Exposure time: GD 6-16 Number of exposures: 6 hrs/d NOAEL Teratogenicity: > = 195 ppm NOAEL Maternal: > = 195 ppm</p> <p>Species: Rat Application Route: Inhalation Dose: 11, 99, 195 ppm Exposure time: GD6-19 Number of exposures: 6 hrs/d NOAEL Teratogenicity: > =195 ppm NOAEL Maternal: > = 195 ppm</p> <p>Species: Rat Application Route: oral gavage Dose: 10, 50, 200 mg/kg bw/day Exposure time: 42-53 days Number of exposures: Daily NOAEL Teratogenicity: 50 mg/kg bw /day NOAEL Maternal: 200 mg/kg bw /day</p>

**Specific Target Organ
Toxicity (Single Exposure)**

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Not classified due to data which are conclusive although insufficient for classification.

**Specific Target Organ
Toxicity (Repeated
Exposure)**

Not classified due to data which are conclusive although insufficient for classification.

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Aspiration toxicity**

: May be harmful if swallowed and enters airways.

CMR effects

Tetrahydrothiophene

: Mutagenicity: Tests on bacterial or mammalian cell cultures did not show mutagenic effects.
Teratogenicity: Animal testing did not show any effects on fetal development.
Reproductive toxicity: Animal testing did not show any effects on fertility.

t-Butyl Mercaptan

Carcinogenicity: Not available
Mutagenicity: Tests on bacterial or mammalian cell cultures did not show mutagenic effects., In vivo tests did not show mutagenic effects
Reproductive toxicity: No evidence of adverse effects on sexual function and fertility, or on development, based on animal experiments.

Tetrahydrothiophene

Mutagenicity: Tests on bacterial or mammalian cell cultures did not show mutagenic effects.
Teratogenicity: Animal testing did not show any effects on fetal development.
Reproductive toxicity: Animal testing did not show any effects on fertility.

t-Butyl Mercaptan

Carcinogenicity: Not available
Mutagenicity: Tests on bacterial or mammalian cell cultures did not show mutagenic effects., In vivo tests did not show mutagenic effects
Reproductive toxicity: No evidence of adverse effects on sexual function and fertility, or on development, based on animal experiments.

Reproductive toxicity

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t-Butyl Mercaptan : Species: Rat
 Sex: male and female
 Application Route: oral gavage
 Dose: 10, 50, 200 mg/kg bw/day
 Number of exposures: Daily
 Test period: 42 -53 days
 Method: OECD Guideline 422
 NOAEL Parent: 200 mg/kg bw/day
 NOAEL F1: 50 mg/kg bw/day
 No adverse effects expected

Species: Rat
 Sex: male and female
 Application Route: oral gavage
 Dose: 10, 50, 200 mg/kg bw/day
 Number of exposures: Daily
 Test period: 42 -53 days
 Method: OECD Guideline 422
 NOAEL Parent: 200 mg/kg bw/day
 NOAEL F1: 50 mg/kg bw/day
 No adverse effects expected

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Further information : Solvents may degrease the skin.

SECTION 12: Ecological information

Ecological Toxicity

Toxicity to fish

Tetrahydrothiophene : LC50: > 24 mg/l
 Exposure time: 96 h
 Species: Danio rerio (Zebra Fish)
 Method: OECD Test Guideline 203

t-Butyl Mercaptan LC50: 34 mg/l
 Exposure time: 96 h
 Species: Oncorhynchus mykiss (rainbow trout)
 semi-static test Method: OECD Test Guideline 203

Tetrahydrothiophene LC50: > 24 mg/l
 Exposure time: 96 h
 Species: Danio rerio (Zebra Fish)
 Method: OECD Test Guideline 203

t-Butyl Mercaptan LC50: 34 mg/l
 Exposure time: 96 h
 Species: Oncorhynchus mykiss (rainbow trout)
 semi-static test Method: OECD Test Guideline 203

Toxicity to daphnia and other aquatic invertebrates

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Tetrahydrothiophene	: EC50: 24 mg/l Exposure time: 48 h Species: Daphnia magna (Water flea) Method: OECD Test Guideline 202
t-Butyl Mercaptan	EC50: 6.7 mg/l Exposure time: 48 h Species: Daphnia magna (Water flea) static test Method: OECD Test Guideline 202
Tetrahydrothiophene	EC50: 24 mg/l Exposure time: 48 h Species: Daphnia magna (Water flea) Method: OECD Test Guideline 202
t-Butyl Mercaptan	EC50: 6.7 mg/l Exposure time: 48 h Species: Daphnia magna (Water flea) static test Method: OECD Test Guideline 202

Toxicity to algae

Tetrahydrothiophene	: EC50: > 153.2 mg/l Exposure time: 72 h Species: Pseudokirchneriella subcapitata (green algae) Method: OECD Test Guideline 201
t-Butyl Mercaptan	EC50: 24 mg/l Exposure time: 72 h Species: Pseudokirchneriella subcapitata (green algae) Method: OECD Test Guideline 201
Tetrahydrothiophene	EC50: > 153.2 mg/l Exposure time: 72 h Species: Pseudokirchneriella subcapitata (green algae) Method: OECD Test Guideline 201
t-Butyl Mercaptan	EC50: 24 mg/l Exposure time: 72 h Species: Pseudokirchneriella subcapitata (green algae) Method: OECD Test Guideline 201

Toxicity to bacteria

Tetrahydrothiophene	: EC50: 1,530 mg/l Exposure time: 3 h Respiration inhibition Method: OECD Test Guideline 209
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EC50: 1,530 mg/l
 Exposure time: 3 h
 Respiration inhibition
 Method: OECD Test Guideline 209

Persistence and degradability
 Persistence and degradability : This material is not expected to be readily biodegradable.

Bioaccumulative

Tetrahydrothiophene : No bioaccumulation is to be expected (log Pow <= 4).

t-Butyl Mercaptan : Bioconcentration factor (BCF): 12
 Method: QSAR modeled data
 This material is not expected to bioaccumulate.

Tetrahydrothiophene : No bioaccumulation is to be expected (log Pow <= 4).

t-Butyl Mercaptan : Bioconcentration factor (BCF): 12
 Method: QSAR modeled data
 This material is not expected to bioaccumulate.

Mobility

Tetrahydrothiophene : The product will be dispersed amongst the various environmental compartments (soil/ water/ air).

t-Butyl Mercaptan : Method: Calculation, Mackay Level III Fugacity Model
 The product will be dispersed amongst the various environmental compartments (soil/ water/ air).

Tetrahydrothiophene : The product will be dispersed amongst the various environmental compartments (soil/ water/ air).

t-Butyl Mercaptan : Method: Calculation, Mackay Level III Fugacity Model
 The product will be dispersed amongst the various environmental compartments (soil/ water/ air).

Results of PBT assessment

Tetrahydrothiophene : Non-classified PBT substance, Non-classified vPvB substance

t-Butyl Mercaptan : Non-classified PBT substance, Non-classified vPvB substance

Tetrahydrothiophene : Non-classified PBT substance, Non-classified vPvB substance

t-Butyl Mercaptan : Non-classified PBT substance, Non-classified vPvB substance

Other adverse effects : Toxic to aquatic life with long lasting effects.

Ecotoxicology Assessment

Short-term (acute) aquatic hazard

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Tetrahydrothiophene	:	Harmful to aquatic life.
t-Butyl Mercaptan	:	Toxic to aquatic life.
Tetrahydrothiophene	:	Harmful to aquatic life.
t-Butyl Mercaptan	:	Toxic to aquatic life.
Long-term (chronic) aquatic hazard		
Tetrahydrothiophene	:	Harmful to aquatic life with long lasting effects.
t-Butyl Mercaptan	:	Toxic to aquatic life with long lasting effects.
Tetrahydrothiophene	:	Harmful to aquatic life with long lasting effects.
t-Butyl Mercaptan	:	Toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

The information in this SDS pertains only to the product as shipped.

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

Disposal method	:	The product should not be allowed to enter drains, water courses or the soil. Do not contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company.
Disposal precaution	:	Empty remaining contents. Dispose of as unused product. Do not re-use empty containers. Do not burn, or use a cutting torch on, the empty drum.

SECTION 14: Transport information

The shipping descriptions shown here are for bulk shipments only, and may not apply to shipments in non-bulk packages (see regulatory definition).

Consult the appropriate domestic or international mode-specific and quantity-specific Dangerous Goods Regulations for additional shipping description requirements (e.g., technical name or names, etc.) Therefore, the information shown here, may not always agree with the bill of lading shipping description for the material. Flashpoints for the material may vary slightly between the SDS and the bill of lading.

UN Number	:	UN3336
UN Product Shipping Name	:	MERCAPTAN MIXTURE, LIQUID, FLAMMABLE, N.O.S.
Hazard Class	:	3

Number:100000014177

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	:	
Packing Group	:	II - Hazardous Properties
Marine Pollutant	:	Yes
Special Safety Measures on Mode of Transport	:	No data available

US DOT (UNITED STATES DEPARTMENT OF TRANSPORTATION)

UN3336, MERCAPTAN MIXTURE, LIQUID, FLAMMABLE, N.O.S., (TETRAHYDROTHIOPHENE, TERTIARY BUTYL MERCAPTAN), 3, II

IMO / IMDG (INTERNATIONAL MARITIME DANGEROUS GOODS)

UN3336, MERCAPTAN MIXTURE, LIQUID, FLAMMABLE, N.O.S., (TETRAHYDROTHIOPHENE, TERTIARY BUTYL MERCAPTAN), 3, II, (>-17.8°C), MARINE POLLUTANT, (TERTIARY BUTYL MERCAPTAN)

IATA (INTERNATIONAL AIR TRANSPORT ASSOCIATION)

UN3336, MERCAPTAN MIXTURE, LIQUID, FLAMMABLE, N.O.S., (TETRAHYDROTHIOPHENE, TERTIARY BUTYL MERCAPTAN), 3, II

ADR (AGREEMENT ON DANGEROUS GOODS BY ROAD (EUROPE))

UN3336, MERCAPTAN MIXTURE, LIQUID, FLAMMABLE, N.O.S., (TETRAHYDROTHIOPHENE, TERTIARY BUTYL MERCAPTAN), 3, II, (D/E), ENVIRONMENTALLY HAZARDOUS, (TERTIARY BUTYL MERCAPTAN)

RID (REGULATIONS CONCERNING THE INTERNATIONAL TRANSPORT OF DANGEROUS GOODS (EUROPE))

UN3336, MERCAPTAN MIXTURE, LIQUID, FLAMMABLE, N.O.S., (TETRAHYDROTHIOPHENE, TERTIARY BUTYL MERCAPTAN), 3, II, ENVIRONMENTALLY HAZARDOUS, (TERTIARY BUTYL MERCAPTAN)

ADN (EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY INLAND WATERWAYS)

UN3336, MERCAPTAN MIXTURE, LIQUID, FLAMMABLE, N.O.S., (TETRAHYDROTHIOPHENE, TERTIARY BUTYL MERCAPTAN), 3, II, ENVIRONMENTALLY HAZARDOUS, (TERTIARY BUTYL MERCAPTAN)

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Maritime transport in bulk according to IMO instruments

SECTION 15: Regulatory information**National legislation****Regulation under the Occupational Safety and Health Act**

A Material Safety Datasheet (MSDS) for this product is not required according to article 41 of the ISHA.

Regulation	Chemical name	Threshold limits
Harmful Substances Prohibited from Manufacturing	: Not applicable	
Harmful Substances Required Permission for Manufacture	: Not applicable	

Act on the Registration and Evaluation, etc. of Chemical Substances, Chemicals Control Act

Regulation	Chemical name	Threshold limits
Toxic Chemicals	: Not applicable	
Prohibited Chemicals	: Not applicable	
Restricted Chemicals	: Not applicable	
Toxic Release Inventory	: Not applicable	

Dangerous Substances Safety Management Act

Dangerous Substances Safety Management Act : Flammable liquids, Type 1 petroleums, Water insoluble liquid

Regulations by the Waste Management Act : Not applicable

Regulations by other domestic and foreign laws

Europe REACH : This mixture contains only ingredients which have been registered according to Regulation (EU) No. 1907/2006 (REACH).

Switzerland CH INV : On the inventory, or in compliance with the inventory

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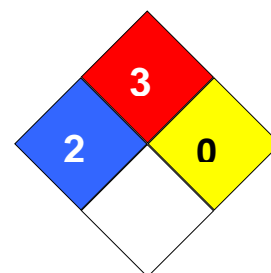
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United States of America (USA) TSCA	:	On or in compliance with the active portion of the TSCA inventory
Canada DSL	:	All components of this product are on the Canadian DSL
Other AICS	:	On the inventory, or in compliance with the inventory
New Zealand NZIoC	:	On the inventory, or in compliance with the inventory
Japan ENCS	:	On the inventory, or in compliance with the inventory
Korea KECI	:	All substances in this product were registered, notified to be registered, or exempted from registration by CPChem through an Only Representative according to K-REACH regulations. Importation of this product is permitted if the Korean Importer of Record was included on CPChem's notifications or if the Importer of Record themselves notified the substances.
Philippines PICCS	:	On the inventory, or in compliance with the inventory
China IECSC	:	On the inventory, or in compliance with the inventory
Taiwan TCSI	:	On the inventory, or in compliance with the inventory
Other regulations	:	No data available

SECTION 16: Other information

Source of data	:	Korea. GHS based classification
Date of initial writing	:	2021-08-24
Revision number	:	1
Last revision date	:	2022-12-22

NFPA Classification : Health Hazard: 2
Fire Hazard: 3
Reactivity Hazard: 0

**Other information**

None.

Significant changes since the last version are highlighted in the margin. This version replaces all previous versions.

The information in this SDS pertains only to the product as shipped.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a

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guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Key or legend to abbreviations and acronyms used in the safety data sheet

ACGIH	American Conference of Government Industrial Hygienists	LD50	Lethal Dose 50%
AIIC	Australian Inventory of Industrial Chemicals	LOAEL	Lowest Observed Adverse Effect Level
DSL	Canada, Domestic Substances List	NFPA	National Fire Protection Agency
NDSL	Canada, Non-Domestic Substances List	NIOSH	National Institute for Occupational Safety & Health
CNS	Central Nervous System	NTP	National Toxicology Program
CAS	Chemical Abstract Service	NZIoC	New Zealand Inventory of Chemicals
EC50	Effective Concentration	NOAEL	No Observable Adverse Effect Level
EC50	Effective Concentration 50%	NOEC	No Observed Effect Concentration
EGEST	EOSCA Generic Exposure Scenario Tool	OSHA	Occupational Safety & Health Administration
EOSCA	European Oilfield Specialty Chemicals Association	PEL	Permissible Exposure Limit
EINECS	European Inventory of Existing Chemical Substances	PICCS	Philippines Inventory of Commercial Chemical Substances
MAK	Germany Maximum Concentration Values	PRNT	Presumed Not Toxic
GHS	Globally Harmonized System	RCRA	Resource Conservation Recovery Act
>=	Greater Than or Equal To	STEL	Short-term Exposure Limit
IC50	Inhibition Concentration 50%	SARA	Superfund Amendments and Reauthorization Act.
IARC	International Agency for Research on Cancer	TLV	Threshold Limit Value
IECSC	Inventory of Existing Chemical Substances in China	TWA	Time Weighted Average
ENCS	Japan, Inventory of Existing and New Chemical Substances	TSCA	Toxic Substance Control Act
KECI	Korea, Existing Chemical Inventory	UVCB	Unknown or Variable Composition, Complex Reaction Products, and Biological Materials
<=	Less Than or Equal To	WHMIS	Workplace Hazardous Materials Information System
LC50	Lethal Concentration 50%	ATE	Acute toxicity estimate