

Diethyl Sulfide

Version 1.3

Revision Date 2013-12-10

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

Trade name : Diethyl Sulfide
Material : 1017947, 1024545, 1024826

Use : Sulfiding Chemical

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

Emergency telephone:**Health:**

866.442.9628 (North America)

1.832.813.4984 (International)

Transport:

North America: CHEMTREC 800.424.9300 or 703.527.3887

Asia: +800 CHEMCALL (+800 2436 2255)

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

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

Responsible Department : Product Safety and Toxicology Group
E-mail address : MSDS@CPChem.com
Website : www.CPChem.com

SECTION 2: Hazards identification**Emergency Overview****Form:** Liquid **Physical state:** Liquid **Color:** Clear **Odor:** Pungent, garlic-like

OSHA Hazards : Flammable Liquid, Moderate eye irritant

GHS Classification

: Flammable liquids, Category 2
Eye irritation, Category 2
Chronic aquatic toxicity, Category 3

GHS-Labeling

Symbol(s) :



Signal Word : Danger

Diethyl Sulfide

Version 1.3

Revision Date 2013-12-10

- Hazard Statements** : H225: Highly flammable liquid and vapor.
H319: Causes serious eye irritation.
H412: Harmful 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.
P271: Use only outdoors or in a well-ventilated area.
P280: Wear protective gloves/ protective clothing/ 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): 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.
P312: Call a POISON CENTER or doctor/ physician if you feel unwell.
P331: Do NOT induce vomiting.
P370 + P378: In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
Storage:
P403 + P233: Store in a well-ventilated place. Keep container tightly closed.
P403 + P235: Store in a well-ventilated place. Keep cool.
P405: Store locked up.
Disposal:
P501: Dispose of contents/ container to an approved waste disposal plant.

Carcinogenicity:**IARC**

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

ACGIH

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

SECTION 3: Composition/information on ingredients

- Synonyms** : Diethyl sulfide
1,1'-Thiobisethane
DES
3-thiapentane

Diethyl Sulfide

Version 1.3

Revision Date 2013-12-10

Diethyl thioether
EthylthioethaneMolecular formula : C₄H₁₀S

Component	CAS-No.	Weight %
Diethyl Sulfide	352-93-2	97 - 100

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.
- If inhaled : Consult a physician after significant exposure. If unconscious place in recovery position and seek medical advice.
- In case of skin contact : If on skin, rinse well with water. If on clothes, remove clothes.
- In case of eye contact : Flush eyes with water as a precaution. Remove contact lenses. Protect unharmed eye. Keep eye wide open while rinsing. If eye irritation persists, consult a specialist.
- If swallowed : Keep respiratory tract clear. Do NOT induce vomiting. Do not give milk or alcoholic beverages. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician. Take victim immediately to hospital.

SECTION 5: Firefighting measures

- Flash point : -10 - -4 °C (14 - 25 °F) at 100.4 kPa
- Autoignition temperature : 189 - 199 °C (372 - 390 °F)
at 101.45 - 102.39 kPa
- 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 fire fighting 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.

Diethyl Sulfide

Version 1.3

Revision Date 2013-12-10

- Fire and explosion protection : Do not spray on an open flame or any other 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 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. 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. NORMS based Radon, a radioactive gas, may be present as a trace component in natural gas, natural gas liquids and petrochemicals derived from natural gas. Special precautions should be taken when entering or dismantling equipment in this type of service. Equipment should be checked externally while in service for gamma radiation above background levels. This equipment may contain internal surface deposits of radioactive radon decay products. Minimize unnecessary exposures to these radioactive deposits. Exposures can be reduced by allowing a 4 hour idle (no flow) period before entering or dismantling equipment. During this time the short lived decay products will decay. Longer lived radio nuclides (Pb-210, Bi-210 and Po-210) may be present. Avoid direct skin contact with deposits of radioactivity on surfaces. Avoid generation of dust, smoke or fumes in the work area or if they cannot be avoided, wear a tested and certified respirator for radioactive dusts. Smoking, eating and drinking should be prohibited when working with this equipment. Employees should wash thoroughly with soap and water and discard contaminated

Diethyl Sulfide

Version 1.3

Revision Date 2013-12-10

clothing after entering or handling equipment having radioactive deposits.

Advice on protection against fire and explosion : Do not spray on an open flame or any other 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.

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.

SECTION 8: Exposure controls/personal protection**Engineering measures**

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 : Wear a supplied-air NIOSH approved respirator unless ventilation or other engineering controls are adequate to maintain minimal oxygen content of 19.5% by volume under normal atmospheric pressure. Wear a NIOSH approved respirator that provides protection when working with this material if exposure to harmful levels of airborne material may occur, such as: Air-Purifying Respirator for Organic Vapors. Use a positive pressure, air-supplying respirator if there is potential for uncontrolled release, exposure levels are not known, or other circumstances where air-purifying respirators may not provide adequate protection.

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.

Eye protection : Eye wash bottle with pure water. Tightly fitting safety goggles.

Skin and body protection : Choose body protection according to the amount and concentration of the dangerous substance at the work place. Wear as appropriate: Flame retardant antistatic protective

Diethyl Sulfide

Version 1.3

Revision Date 2013-12-10

clothing. Workers should wear antistatic footwear.

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**

Form : Liquid
Physical state : Liquid
Color : Clear
Odor : Pungent, garlic-like

Safety data

Flash point : -10 - -4 °C (14 - 25 °F) at 100.4 kPa
Lower explosion limit : No data available

Upper explosion limit : No data available

Oxidizing properties : no

Autoignition temperature : 189 - 199 °C (372 - 390 °F)
at 101.45 - 102.39 kPa

Molecular formula : C₄H₁₀S

Molecular Weight : 90.2 g/mol

pH : No data available

Pour point : No data available

Melting point/range : -103.9 °C (-155.0 °F)
at 103.25 hPa

Boiling point/boiling range : 92.1 °C (197.8 °F)

Vapor pressure : 10.00 kPa
at 30.3 °C (86.5 °F)

Density : 0.84 g/cm³
at 20 °C (68 °F)

Water solubility : 3.07 g/l
at 25 °C (77 °F)

Partition coefficient: n-octanol/water : log Pow: 1.95

Solubility in other solvents : Negligible

Viscosity, dynamic : 0.422 mPa.s
at 20 °C (68 °F)

Relative vapor density : 3.1

Diethyl Sulfide

Version 1.3

Revision Date 2013-12-10

(Air = 1.0)

Evaporation rate : No data available

Percent volatile : > 99 %

SECTION 10: Stability and reactivity

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

Possibility of hazardous reactions

Conditions to avoid : Heat, flames and sparks.

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

SECTION 11: Toxicological information**Acute oral toxicity**

Diethyl Sulfide : LD50: > 5,000 mg/kg
Species: rat
Sex: male and female
Method: OECD Test Guideline 401
Information given is based on data obtained from similar substances.

Acute inhalation toxicity

Diethyl Sulfide : LC50: 102 mg/l
Exposure time: 4 h
Species: rat
Sex: male and female
Method: OECD Test Guideline 403
Information given is based on data obtained from similar substances.

Acute dermal toxicity

Diethyl Sulfide : LD50: > 2,000 mg/kg
Sex: male and female
Method: OECD Test Guideline 402
Information given is based on data obtained from similar substances.

Skin irritation

Diethyl Sulfide : slight irritation. Information given is based on data obtained from similar substances.

Eye irritation

Diethyl Sulfide

Version 1.3

Revision Date 2013-12-10

Diethyl Sulfide : Irritating to eyes.
Information given is based on data obtained from similar substances.

Sensitization

Diethyl Sulfide : Does not cause skin sensitization.
Information given is based on data obtained from similar substances.

Repeated dose toxicity

Diethyl Sulfide : Species: rat, male and female
Sex: male and female
Application Route: oral gavage
Dose: 0, 2.5, 25, 250 mg/kg/bw/d
Exposure time: 14 wk
Number of exposures: 7 d/wk
Method: OCED Guideline 408
No adverse effects expected
Information given is based on data obtained from similar substances.

Developmental Toxicity

Diethyl Sulfide : Species: rat
Application Route: oral gavage
Dose: 100, 500, 1000 mg/kg/d
Exposure time: GD 6 -19
Number of exposures: Daily
Test period: 20 d
Method: OECD Guideline 414
NOAEL Teratogenicity: 1,000 mg/kg
NOAEL Maternal: 1,000 mg/kg
No adverse effects expected
Information given is based on data obtained from similar substances.

**Diethyl Sulfide
Aspiration toxicity**

: May be harmful if swallowed and enters airways.

CMR effects

Diethyl Sulfide : Carcinogenicity: Not available
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: Not available

**Diethyl Sulfide
Further information**

: Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting. Concentrations substantially above the TLV value may cause narcotic effects. Solvents may degrease the skin.

Diethyl Sulfide

Version 1.3

Revision Date 2013-12-10

SECTION 12: Ecological information**Toxicity to fish**

Diethyl Sulfide : LC50: > 49.8 mg/l
Exposure time: 96 h
Species: Danio rerio (Zebra Fish)
semi-static test Method: OECD Test Guideline 203

Toxicity to daphnia and other aquatic invertebrates

Diethyl Sulfide : EC50: 17 mg/l
Exposure time: 48 h
Species: Daphnia magna (Water flea)
static test Information given is based on data obtained from similar substances.

Toxicity to algae

Diethyl Sulfide : EC50: 38 mg/l
Exposure time: 72 h
Species: Pseudokirchneriella subcapitata (green algae)
Method: OECD Test Guideline 201
Information given is based on data obtained from similar substances.

M-Factor
diethyl sulphide : 1

Toxicity to bacteria

Diethyl Sulfide : EC50: > 1,000 mg/l
Exposure time: 3 h
Respiration inhibition
Method: OECD Test Guideline 209

Biodegradability

Diethyl Sulfide : aerobic
Result: Not readily biodegradable.
41 %
Testing period: 28 d
Method: OECD Test Guideline 301D
Information given is based on data obtained from similar substances.

Results of PBT assessment

Diethyl Sulfide : Non-classified PBT substance, Non-classified vPvB substance

Additional ecological information : Harmful to aquatic life with long lasting effects.

Diethyl Sulfide

Version 1.3

Revision Date 2013-12-10

SECTION 13: Disposal considerations

The information in this MSDS 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.

Product : Do not dispose of waste into sewer. Do not contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company.

Contaminated packaging : 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 MSDS and the bill of lading.

US DOT (UNITED STATES DEPARTMENT OF TRANSPORTATION)

UN2375, DIETHYL SULFIDE, 3, II

IMO / IMDG (INTERNATIONAL MARITIME DANGEROUS GOODS)

UN2375, DIETHYL SULPHIDE, 3, II, (-10 - -4 °C)

IATA (INTERNATIONAL AIR TRANSPORT ASSOCIATION)

UN2375, DIETHYL SULPHIDE, 3, II

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

UN2375, DIETHYL SULPHIDE, 3, II, (D/E)

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

UN2375, DIETHYL SULPHIDE, 3, II

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

UN2375, DIETHYL SULPHIDE, 3, II

Diethyl Sulfide

Version 1.3

Revision Date 2013-12-10

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code**SECTION 15: Regulatory information****National legislation****SARA 311/312 Hazards** : Fire Hazard**CERCLA Reportable Quantity** : This material does not contain any components with a CERCLA RQ.**SARA 302 Reportable Quantity** : This material does not contain any components with a SARA 302 RQ.**SARA 302 Threshold Planning Quantity** : SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.**SARA 304 Reportable Quantity** : This material does not contain any components with a section 304 EHS RQ.**SARA 313 Ingredients** : SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.**Clean Air Act****Ozone-Depletion Potential** : This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 12 (40 CFR 61).

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 111 SOCM Intermediate or Final VOC's (40 CFR 60.489).

US State Regulations

Diethyl Sulfide

Version 1.3

Revision Date 2013-12-10

Pennsylvania Right To Know

: Diethyl Sulfide - 352-93-2

New Jersey Right To Know

: Diethyl Sulfide - 352-93-2

New Jersey Right To Know

: Diethyl Sulfide - 352-93-2
Related Materials -California Prop. 65
Ingredients

: This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

Notification status

Europe REACH

: On the inventory, or in compliance with the inventory
Notification number: 01-2119971585-25-000

United States of America TSCA

: On the inventory, or in compliance with the inventory

Canada DSL

: On the inventory, or in compliance with the inventory

Australia AICS

: On the inventory, or in compliance with the inventory

New Zealand NZIoC

: On the inventory, or in compliance with the inventory

Japan ENCS

: Not in compliance with the inventory

Korea KECI

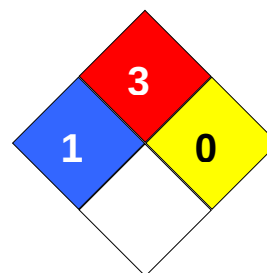
: On the inventory, or in compliance with the inventory

Philippines PICCS

: On the inventory, or in compliance with the inventory

China IECSC

: On the inventory, or in compliance with the inventory

SECTION 16: Other information**NFPA Classification**: Health Hazard: 1
Fire Hazard: 3
Reactivity Hazard: 0**Further information**

Legacy MSDS Number

: 46750

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

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

Diethyl Sulfide

Version 1.3

Revision Date 2013-12-10

The information provided in this Material 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 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%
AICS	Australia, Inventory of Chemical Substances	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%		