

## Safety Data Sheet (SDS) for Thermometric Liquid contained in Red Liquid Thermometers

Per OSHA HCS 2012 (29 CFR 1910.1200)




Industrial and educational thermometers are considered "manufactured articles," and as such, do not require a SDS. Per 29CFR 1910.1200(c), "Definitions. Article means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk..." This SDS is provided for information only.

If broken, the thermometer may release a small quantity of liquid, which should be dealt with using the information provided in this SDS (see Section 6 "Minor Spills").

### SECTION 1-IDENTIFICATION

<b>Product name:</b> Red Spirit Thermometer Liquid
<b>Other names:-</b> Toluene
<b>Proper shipping name:</b> Dangerous Goods in Apparatus
<b>Recommended use of the chemical and restrictions on use:</b> Toluene is used as a mixture added to gasoline to improve octane ratings, and as a solvent for paint, resins, lacquers inks & adhesives. It is also a component of solvent blends and thinners and is used in the manufacture of chemicals, dyes, explosives, and benzoic acid. A further use is as a thermometric liquid. Some grades of toluene may contain traces of xylene and benzene. The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing. Before starting consider control of exposure by mechanical ventilation. WARNING: Intentional misuse by concentrating/inhaling contents may be lethal.
<b>Manufacturer/Supplier Name:</b> United Scientific Supplies, Inc. 3055 N. Oak Grove Ave., Waukegan, IL 60087 USA
<b>Emergency phone No./Fax No.:</b> 847-336-7556

### SECTION 2-HAZARDS IDENTIFICATION

<b>GHS Classification:</b> Flammable Liquid Category 2 Acute Toxicity (Oral) Category 4 Skin Corrosion/ Irritation Category 2 Serious Eye Damage/ Eye Irritation Category 2 Specific Target Organ Toxicity Repeated Exposure Category 2 Hazardous To The Aquatic Environment (Acute) Category 3 Aspiration Hazard Category 1
<b>GHS Label elements:</b> <b>Hazard symbols</b>   
<b>Signal word</b> Danger
<b>Hazard statements</b> Highly flammable liquid and vapor Harmful if inhaled Causes skin irritation Causes serious eye irritation May cause damage to organs through prolonged or repeated exposure. May cause long lasting harmful effects to aquatic life. May be fatal if swallowed and enters airways.
<b>Precautionary statements</b> Use only in well ventilated area. Control of exposure by mechanical ventilation in an unventilated or confined space. Avoid breathing vapors and contact with skin and eyes. Wear breathing apparatus/protective gloves/face protection. Store in well-ventilated place. Disposal must be in accordance with applicable federal, state, or local regulations.
<b>Other hazards:—</b>

**SECTION 3-COMPOSITION/INFORMATION ON INGREDIENTS**

CAS No.	Chemical Name	wt% by weight	EINECS No.
00108-88-3	Toluene	97.0 min.	203-625-9
Synonyms	<b>Methylbenzol; Methylbenzene; Toluol; Phenylmethane</b>		

**SECTION 4-FIRST AID MEASURES**
**Description of necessary first aid measures**

Eye:

1. Flush immediately with warm water for at least 20 minutes.
2. Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
3. If pain persists or recurs seek medical attention.
4. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin:

1. Remove contaminated clothing, shoes, and leathery articles, use cleaning procedure before reuse or waste treatment.
2. Wash affected area thoroughly with soap and water for at least 20 minutes.
3. Call a Physician if irritation develops or persists.

Ingestion:

1. If spontaneous vomiting appears imminent or occurs, hold patient's head down lower than the hips to avoid possible aspiration of vomit.
2. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
3. If victim is conscious and alert, give 2~4 cups of milk/water to dilute the substance in stomach.
4. Never give anything by mouth to an unconscious person.
5. Do not induce vomiting unless directed to do so by medical professional.
6. Seek medical attention.

Inhalation:

1. Remove from further exposure and flush thoroughly with air.
2. Lay patient down. Keep warm and rested.
3. Prostheses such as false teeth, which may block airway, should be removed where possible prior to initiating first aid procedures.
4. If respiratory irritation appears or persists, seek immediate medical assistance and call a physician.

**Most important symptoms/effects, acute and delayed**

Headache, fatigue, drowsiness, insomnia, anorexia and pain in limbs, nervousness, impairment of memory.

**Indication of immediate medical attention and special treatment needed, if necessary**

For acute or short term repeated exposures to toluene:

Inhalation:

1. Inhalation overexposure can produce toxic effects. Monitor for respiratory distress.
2. If cough or difficulty in breathing develops, evaluate for upper respiratory tract inflammation, bronchitis, and pneumonitis. Administer supplemental oxygen with assisted ventilation, as required.
3. This material (or a component) sensitizes the heart to the effects of sympathomimetic amines. Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in individuals exposed to this material.
4. Administration of sympathomimetic drugs should be avoided.

Ingestion:

1. If ingested, this material presents a significant aspiration and chemical pneumonitis hazard.
2. Induction of emesis is not recommended.
3. Consider activated charcoal and/or gastric lavage.
4. If patient is obtunded, protect the airway by cuffed endotracheal intubation or by placement of the body in a Trendelenburg and left lateral decubitus position.

**SECTION 5-FIRE FIGHTING MEASURES****Extinguishing media**

Foam>CO<sub>2</sub>>Dry chemical>Water fog.

**Specific hazards arising from the chemical**

1. Liquid and vapor are highly flammable.
2. Severe fire hazard when exposed to heat, flame and/or oxidizers.
3. Vapor may travel a considerable distance to source of ignition.
4. Heating may cause expansion or decomposition leading to violent rupture of containers.
5. On combustion, may emit toxic fumes of carbon monoxide (CO).

**Special protective equipment and precautions for fire-fighters**

1. Firefighters must use full bunker gear including NIOSH-approved positive pressure self-contained breathing apparatus to protect against potential hazardous combustion or decomposition products and oxygen deficiencies.
2. Evacuate area and fight the fire from a maximum distance or use unmanned hose holders or monitor nozzles.
3. Cover pooling liquid with foam.
4. Containers can build pressure if exposed to radiant heat; cool adjacent containers with flooding quantities of water until well after the fire is out.
5. Withdraw immediately from the area if there is a rising sound from a venting safety device or discoloration of vessels, tanks, or pipelines.
6. Be aware that burning liquid will float on water.
7. Notify appropriate authorities of potential fire and explosion hazard if liquid enter sewers or waterways

**SECTION 6-ACCIDENTAL RELEASE MEASURES****Personal precautions, protective equipment and emergency procedure**

1. Personal protective equipment (See also specifications in Section 8)
  - Eyes: Chemical safety goggles are recommended, and a face shield is added when needed.
  - Skin: Wear appropriate protective gloves to avoid skin contact.
  - Clothing: When direct contact is likely, use rubberized clothing, apron and boots.
  - Respiratory: When limits are exceeded, wear a respirator approved by NIOSH/MSHA for protection against organic dust, mists and vapors.
2. Remove all sources of ignition. No smoking, naked lights or ignition sources. Ventilate area of leak or spill.
3. Keep unnecessary and unprotected personnel from entering. Evacuate personnel from the danger area. Consult with an expert about the emergency procedures.

**Environmental precautions**

1. Prevent spillage from entering drains, surface, and groundwater.
2. Contain and recover liquid when possible. Use non-sparking tools and equipment.
3. Collect liquid in an appropriate container or absorb with an inert material (e.g. vermiculite, dry sand, earth), and place in a chemical waste container.
4. Report the accidental spill/release to local/State government.

**Methods and materials for containment and cleaning up**

Minor spill:

1. Remove all ignition sources.
2. Clean up all spills immediately.
3. Avoid breathing vapors and contact with skin and eyes.
4. Control personal contact by using protective equipment.
5. Contain and absorb small quantities with vermiculite or other absorbent material.
6. Wipe up.
7. Collect residues in a container for flammable waste.

Major spill

1. Clear area of personnel and move upwind.
2. Alert emergency responders and tell them location and nature of hazard.
3. May be violently or explosively reactive.
4. Wear breathing apparatus plus protective gloves.
5. Prevent spillage from entering drains or watercourse.
6. No smoking, naked lights or ignition sources. Increase ventilation.
7. Stop leak if safe to do so.
8. Water spray or fog may be used to disperse/absorb vapor.
9. Contain spill with sand, earth or vermiculite.
10. Use only spark-free shovels and explosion proof equipment.
11. Collect recoverable product into labeled containers for recycling..
12. Absorb remaining product with sand, earth or vermiculite.
13. Collect solid residues and seal in labeled drums for disposal.
14. Wash area and prevent runoff into drains.
15. If contamination of drains or waterways occurs, advise emergency services.

**SECTION 7-HANDLING AND STORAGE****Precautions for safe handling**

1. Wash thoroughly after handling.
2. Use only in a well ventilated area.
3. Ground and bond containers when transferring.
4. Use spark-free tools and explosion proof equipment.
5. Empty containers retain product residue (liquid/vapor), and can be dangerous.
6. Do not pressurize, cut, weld, braze, solder, drill, or expose empty containers to heat, sparks or open flames.

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

1. Store in original containers in approved flame-proof area.
2. No smoking, naked lights, heat or ignition sources.
3. DO NOT store in pits, depressions, basements or areas where vapors may be trapped.
4. Keep containers securely sealed.
5. Store away from incompatible materials in a cool, dry well ventilated area.
6. Protect containers against physical damage and check regularly for leaks.
7. Keep containers tightly closed and store in a cool, dry, well-ventilated place, plainly labeled, and out of closed vehicles.
8. Ground all equipment containing this material.
9. Observe manufacturer's storing and handling recommendations.
10. Containers should be able to withstand pressures expected from warming and cooling in storage. This flammable liquid should be stored in a separate safety cabinet or room. A refrigerated room is preferable for materials with a flash point temperature lower than 70°F (21°C).

**SECTION 8-EXPOSURE CONTROLS, PERSONAL PROTECTION**

OSHA - Final PEL: 200 ppm TWA.

OSHA Ceiling: 300ppm.

ACGIH: 50 ppm, skin -potential for cutaneous absorption.

NIOSH: 100 ppm TWA; 375 mg/m<sup>3</sup> TWA; 500 ppm IDLH.

Taiwan TWA: 100 ppm (skin). Taiwan

STEL: 125 ppm (skin).

Taiwan Ceiling: -----.

Taiwan BEI: 1 mg/l (before on duty).

### Engineering control

1. Process should be located at least 17 meters (50 feet) away from open flames and all high temperature operations likely to cause ignition of styrene monomer vapor.
2. In venting styrene monomer vapors, consideration should be given to possible halogenation of the vapors by low concentrations of free chlorine and bromine with the resultant formation of lacrimation.
3. Process should be designed so that the operator is not exposed to direct contact with Toluene or the vapor. The technical problems of designing equipment, providing adequate ventilation and operating procedures which promise maximum security and economy, can best be handled by competent engineers.
4. It is essential for safety that equipment be used and maintained as recommended by the manufacturer.
5. Tanks used to store or process Toluene should be closed vessels vented to a safe point of discharge in the outside atmosphere away from operating stations, roadways, and at least 17 meters (50 feet) from possible sources of ignitions. All sparks, flames, heated surface, or other sources of ignition should be kept away from all vents. It is advisable to provide suction on vessels when inspection or observation openings are made, to minimize or eliminate escape of vapors.

### Personal protective equipment

#### Eye Protection:

Safety glasses equipped with side shields are recommended as minimum protection in industrial settings. Chemical goggles should be worn during transfer operations or when there is a likelihood of misting, splashing, or spraying of this material. A suitable emergency eye wash water and safety shower should be located near the work station.

#### Skin protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

#### Clothing:

Avoid skin contact. Wear long-sleeved fire-retardant garments (e.g., Nomex®) while working with flammable and combustible liquids. Additional chemical-resistant protective gear may be required if splashing or spraying conditions exist. This may include an apron, boots and additional facial protection. If product comes in contact with clothing, immediately remove soaked clothing and shower. Promptly remove and discard contaminated leather goods.

#### Respirators

For known vapor concentrations above the occupational exposure guidelines (see below), use a NIOSH-approved organic vapor respirator if adequate protection is provided. Protection factors vary depending upon the type of respirator used. Respirators should be used in accordance with OSHA requirements (29 CFR 1910.134). For airborne vapor concentrations that exceed the recommended protection factors for organic vapor respirators, use a full-face, positive-pressure, supplied air respirator. Due to fire and explosion hazards, do not enter atmospheres containing concentrations greater than 10% of the lower flammable limit of this product.

## SECTION 9-PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Transparent liquid	Upper/lower explosive limits : 7.1%/1.2%
Odor : pleasant aromatic petroleum odor	Vapor Pressure : 22 mmHg @ 20°C (68°F)
Odor threshold : 0.16~37 ppm (detect) 1.9~69 ppm (recognition)	Vapor Density : 3.1 (air=1)
pH : Not available	Relative density : 0.86 (water=1)
Melting/Freezing Point : -95°C (-139°F)	Solubility in water : 54~58 mg/100 ml
Initial boiling point/boiling range: 110.6°C (231.8°F)	Partition coefficient : 2.73 (n-octanol/water)
Flash point : 4.4°C (39.9°F) (closed cup)	Auto-ignition temperature : 480°C (896°F)
Evaporation Rate : 2.24 (BuAc=1)	Decomposition temperature : Not available
Flammability (solid/gas) : Not available	Viscosity : 0.6 mPa.s max @ 20°C (68°F)
Molecular Formula : C <sub>6</sub> H <sub>5</sub> CH <sub>3</sub>	Molecular Weight : 92.056

**SECTION 10-STABILITY AND REACTIVITY**
**Reactivity**

Vapor is explosive when exposed to heat or flame

**Chemical stability**

Stable at room temperature in closed containers under normal storage and handling conditions.

**Possibility of hazardous reaction**

Has not been reported.

**Condition to avoid**

Product is highly flammable – Keep away from sources of ignition. Avoid the higher temperatures. Keep away from open fire, heating elements and heat radiating surface and prevent from forming of the vapors mixtures with air in explosion limits.

**Incompatible materials**

Heat, flame, strong oxidizers, nitric and sulfuric acids, chlorine, nitrogen tetroxide; will attack some forms of plastics, rubber, coatings.

**Hazardous decomposition products**

Carbon monoxide, carbon dioxide, hydrocarbons.

**SECTION 11-TOXICOLOGICAL INFORMATION**
**Routes of exposure**

Eye, Skin, inhalation, Ingestion.

**Symptoms (treatments as indicated in Section 4)**

**Eye:** The liquid produces a high level of eye discomfort and is capable of causing pain and severe conjunctivitis. Corneal injury may develop, with possible permanent impairment of vision, if not promptly and adequately treated. There is evidence that material may produce eye irritation in some persons and produce eye damage 24 hours or more after instillation. Severe inflammation may be expected with pain. There may be damage to the cornea. Unless treatment is prompt and adequate there may be permanent loss of vision. Conjunctivitis can occur following repeated exposure.

**Skin:** Contact with the material may damage the health of the individual; systemic effects may result following absorption. The material may cause moderate inflammation of the skin either following direct contact or after a delay of some time. Repeated exposure can cause contact dermatitis which is characterized by redness, swelling and blistering. Entry into the blood-stream, through cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

**Ingestion:** Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual. Swallowing of the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis; serious consequences may result. (ICSC13733). Considered an unlikely route of entry in commercial/industrial environments. The liquid may produce gastrointestinal discomfort and may be harmful if swallowed. Ingestion may result in nausea, pain and vomiting. Vomit entering the lungs by aspiration may cause potentially lethal chemical pneumonitis.

**Inhalation:** Inhalation of vapors or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual. There is some evidence to suggest that the material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage. Inhalation of vapors may cause drowsiness and dizziness. This may be accompanied by sleepiness, reduced alertness, loss of reflexes, lack of coordination, and vertigo. Inhalation of high concentrations of gas/vapor causes lung irritation with coughing and nausea, central nervous depression with headache and dizziness, slowing of reflexes, fatigue and incoordination. If exposure to highly concentrated solvent atmosphere is prolonged this may lead to narcosis, unconsciousness, even coma and possible death. The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing. Before starting consider control of exposure by mechanical ventilation.

Chronic exposure: There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment. Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.

**Toxicity**

LD50: <870 mg/kg (rat, oral)

LC50: 6000 ppm/6h (rat, inhalation)

**Chronic effect**

**Carcinogenicity:**

ACGIH: A4-Not classifiable as a Human Carcinogen.

OSHA: Possible select carcinogen.

IARC: Group 3 carcinogen.

Epidemiology: Not available.

Teratogenicity: Teratogenic effects have occurred in experimental animals.

Reproductive Effects: Adverse reproductive effects have occurred in experimental animals.

Neurotoxicity: Not available.

Mutagenicity: Not available.

**SECTION 12-ECOLOGICAL INFORMATION**

**Ecotoxicity**

LC50 (96 hr.) Fish: 7.3~22.8 mg/l

EC50 (48 hr.) Water flea: —

Bioconcentration factor (BCF): 1.67~380

**Persistence and degradability**

1. The materials are expected to form a slick on the surface of waters after release in calm sea conditions. This is expected to evaporate and enter the atmosphere where it will be degraded through reaction with hydroxyl radicals.
2. Some of the material will become associated with benthic sediments, and it is likely to be spread over a fairly wide area of sea floor. Marine sediments may be either aerobic or anaerobic. The material, in probability, is biodegradable, under aerobic conditions. Evidence also suggests that the hydrocarbons may be degradable under anaerobic conditions although such degradation in benthic sediments may be a relatively slow process.
3. Under aerobic conditions the material will degrade to water and carbon dioxide, while under anaerobic processes it will produce water, methane, carbon dioxide and carbon dioxide.
4. Based on test results, as well as theoretical considerations, the potential for bioaccumulation may be high. Toxic effects are often observed in species such as blue mussel, daphnia, freshwater green algae, marine copepods and amphipods.

Half-life (Air): 10~104 hr

Half-life (Surface water): 96~528 hr

Half-life (Ground water): 168~672 hr

Half-life (Soil): 96~528 hr

**Bioaccumulative potential**

This material is not expected to significantly bioaccumulate.

**Mobility in soil:** —




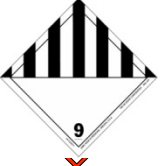
**Other adverse effects:** —

**SECTION 13-DISPOSAL CONSIDERATIONS**

Residues and spilled material are hazardous waste due to ignitability. Disposal must be in accordance with applicable federal, state, or local regulations.

The container for this product can present explosion or fire hazards, even when emptied. To avoid risk of injury, do not cut, puncture, or weld on or near this container. Since the emptied containers retain product residue, follow label warnings even after container is emptied.

**SECTION 14-TRANSPORTATION INFORMATION**

US DOT	Shipping Name	Dangerous Goods in Apparatus	Hazard Labels	
	Hazard Class	9		
	UN Number	3363		
	Packing Group	n/a		
Sea(IMO/IMDG)	Shipping Name	Dangerous Goods in Apparatus	Hazard Labels	
	Hazard Class	9		
	UN Number	3663		
	Packing Group	n/a		
	MARPOL	Not a DOT "Marine Pollutant" per 49 CFR 171.8.		
Air(ICAO/IATA)	Shipping Name	Dangerous Goods in Apparatus	Hazard Labels	
	Hazard Class	9		
	Subsidiary Class	n/a		
	Packing Group	n/a		
RID/ ADR	No information available.			
Canadian TDG	Shipping Name	Dangerous Goods in Apparatus	Hazard Labels	
	Hazard Class	9		
	UN Number	3363		
	Packing Group	n/a		
	Subsidiary Class	n/a		



**Clean Water Act**

CAS# 108-88-3 is listed as a Hazardous Substance under the CWA.  
CAS# 108-88-3 is listed as a Priority Pollutant under the Clean Water Act.  
CAS# 108-88-3 is listed as a Toxic Pollutant under the Clean Water Act.

**OSHA**

None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**

Toluene can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

**WARNING:** This product contains Toluene, a chemical known to the state of California to cause birth defects or other reproductive harm.

California No Significant Risk Level: None of the chemicals in this product are listed.

**US FEDERAL****TSCA**

CAS# 108-88-3 is listed on the TSCA inventory.

**Health & Safety Reporting List**

CAS# 108-88-3: Effective Date: 10/4/82; Sunset Date: 10/4/92

**Chemical Test Rules**

None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**

None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**

None of the chemicals in this material have a SNUR under TSCA.

**SARA****Section 302 (RQ)**

CAS# 108-88-3: final RQ = 1000 pounds (454 kg)

**Section 302 (TPQ)**

None of the chemicals in this material have a TPQ.

**SARA Codes**

CAS# 108-88-3: acute, flammable.

**Section 313**

This material contains Toluene (CAS# 108-88-3, 99% & 100%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.

**Clean Air Act**

CAS# 108-88-3 is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depletors.

This material does not contain any Class 2 Ozone depletors.

**European/International Regulations****European Labeling in Accordance with EC Directives Hazard**

Symbols: XN F

Risk Phrases : R 10 Flammable.

R 20 Harmful by inhalation.

Safety Phrases : S 9 Keep container in a well-ventilated place.

S 16 Keep away from sources of ignition - No smoking. S 25

Avoid contact with eyes.

S 29 Do not empty into drains.

S 33 Take precautionary measures against static discharges. WGK

**(Water Danger/Protection)**

CAS# 108-88-3: 2

**United Kingdom Occupational Exposure Limits**CAS# 108-88-3: OES-United Kingdom, TWA 50 ppm TWA; 191 mg/m<sup>3</sup> TWA. CAS# 108-88-3: OES-United Kingdom, STEL 150 ppm STEL; 574 mg/m<sup>3</sup> STEL.**CANADA**

CAS#100-42-5 is listed on Canada's DSL/NDSL list.

This product has a WHMIS classification of B2, D2A (99%)/B3, D2A (100%). CAS# 105-05-5 is not listed on Canada's Ingredient Disclosure List.

**Exposure Limits**

- CAS# 108-88-3: OEL-AUSTRALIA:TWA 100 ppm (375 mg/m<sup>3</sup>);STEL 150 ppm (560 mg/m<sup>3</sup>)
- OEL-BELGIUM:TWA 100 ppm (377 mg/m<sup>3</sup>);STEL 150 ppm (565 mg/m<sup>3</sup>)
- OEL-CZECHOSLOVAKIA:TWA 200 mg/m<sup>3</sup>;STEL 1000 mg/m<sup>3</sup>
- OEL-DENMARK:TWA50 ppm (190 mg/m<sup>3</sup>);Skin
- OEL-FINLAND:TWA 100 ppm (375 mg/m<sup>3</sup>);STEL 150 ppm; Skin
- OEL-FRANCE:TWA 100 ppm (375 mg/m<sup>3</sup>);STEL 150 ppm (560 mg/m<sup>3</sup>)
- OEL-GERMANY:TWA 100 ppm (380 mg/m<sup>3</sup>)
- OEL-HUNGARY:TWA 100 mg/m<sup>3</sup>;STEL 300mg/m<sup>3</sup>;Skin
- OEL-JAPAN:TWA 100 ppm (380 mg/m<sup>3</sup>)
- OEL-THE NETHERLANDS:TWA 100 ppm (375mg/m<sup>3</sup>);Skin
- OEL-THE PHILIPPINES:TWA 100 ppm (375 mg/m<sup>3</sup>)
- OEL-POLAND:TWA 100mg/m<sup>3</sup>
- OEL-RUSSIA:TWA 100 ppm; STEL 50 mg/m<sup>3</sup>
- OEL-SWEDEN:TWA 50 ppm (200 mg/m<sup>3</sup>);STEL 100 ppm (400 mg/m<sup>3</sup>);Skin
- OEL-SWITZERLAND:TWA 100 ppm (380 mg/m<sup>3</sup>);STEL 500 ppm
- OEL-THAILAND:TWA200 ppm; STEL 300 ppm
- OEL-TURKEY:TWA 200 ppm (750 mg/m<sup>3</sup>)
- OEL-UNITED KINGDOM:TWA 100 ppm (375 mg/m<sup>3</sup>);STEL 150 ppm; Skin OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**References and sources**

1. CHEMINFO Data Bank, CCINFO CD, 2005-3
2. HAZARD TEXT Data Bank, TOMES PLUS CD, Vol.65, 2005
3. RETECS Data Bank, TOMES CPS CD, Vol.65, 2005
4. HSDB Data Bank, TOMES CPS CD, Vol.65, 2005
5. Hazardous Substance Data Bank, Environment Protection, Administration, Executive Yuan, ROC (Taiwan)
6. Chemwatch Data Bank, 2005-1
7. SDS, GHS in Taiwan, Council of Labor Affairs, Executive Yuan, ROC (Taiwan)

<b>Version</b>	<b>Date</b>	<b>Remark</b>
Version 1	06/13/2016	Original Version.
Version 2	03/12/2021	Reviewed and re-issued
Prepared by	United Scientific Supplies, Inc..	

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