SAFETY DATA SHEET

Tripicrin

1. IDENTIFICATION of the SUBSTANCE/MIXTURE and of the COMPANY/UNDERTAKING

PRODUCT IDENTIFIER: Tripicrin SDS No.: 100-ZAF-TAF
OTHER MEANS OF IDENTIFICATION: Chloropicrin, Trichloronitromethane
RECOMMENDED USE: Pesticide (Pre-Plant Soil Fumigant)

Distributor:	**FOR CHEMICAL EMERGENCY (Spill, Leak, Fire, Exposure, or Accident), Call CHEMTREC:**
Trical Crop Protection Africa (Pty) Ltd P.O. Box 46036 Durbanville, Cape Town, 7551, Republic of South Africa Telephone: +27 861 111 998 E-mail: sds@trical.com	080-098-3611 (24 hours, within South Africa) +1 703-527-3887 (if outside South Africa)

RESTRICTIONS ON USE: For use by registered pest control operators only. Use only in accordance with the product's pesticide end-use label. If the end-use labeling contains specific instructions or requirements that conflict with this Safety Data Sheet (SDS), **follow the instructions or requirements on the labeling**.

2. HAZARDS IDENTIFICATION

Note: Supplemental information is [bracketed] or noted as such in Section 2

GHS Classification for Product 	H330 Acute Toxicity - Inhalation, Category 1 H300 Acute Toxicity - Oral, Category 2 H311 Acute Toxicity - Dermal, Category 3 H314 Skin Corrosion/Irritation, Category 1C H318 Eye Damage/Irritation, Category 1 [liquid contact] H319 Eye Damage/Irritation, Category 2A [vapour contact] H370 Specific Target Organ Toxicity, Single Exposure, Category 1 H372 Specific Target Organ Toxicity, Repeat Exposure, Category 1 H400 Hazardous to the Aquatic Environment, Short Term (Acute) Hazard, Category 1 H410 Hazardous to the Aquatic Environment, Long Term (Chronic) Hazard, Category 1
Additional GHS Classification for Product When it is Under Pressure in Cylinder 	H284 Chemicals under pressure, Category 3
Signal Word	**DANGER**
GHS Hazard Statements	• Fatal if inhaled or if swallowed. H330+H300 • Toxic in contact with skin. H311 • Causes severe skin burns and eye damage. H314 • Causes serious eye irritation. [vapour contact] H319 • Causes damage to respiratory system and hemal system by inhalation. H370 • Causes damage to respiratory system, hemal system, and liver through prolonged or repeated exposure. H372 • Very toxic to aquatic life with long lasting effects. H400+H410
Additional GHS Hazard Statement When Product Under Pressure in Cylinder	• Chemical under pressure: May explode if heated. H284

GHS PRECAUTIONARY STATEMENTS

Prevention

- Do not breathe gas or vapours. P260
- Do not get in eyes, on skin, or on clothing. P262
- Use only outdoors or in a well-ventilated area. P271
- Wear protective gloves, eye and respiratory protection. [See section 8 of SDS] P280+P284
- Wash hands and face thoroughly after handling. Do not touch eyes. P264+P265
- Do not eat, drink, or smoke when using this product. P270
- Avoid release to the environment, [except for authorised use]. P273

Response [First Aid, See Section 4 of SDS for additional information]

- **IF INHALED**: Remove person to fresh air and keep comfortable for breathing. Get emergency medical help immediately. Specific treatment is urgent (see First Aid section of label and Section 4 of SDS). P304+P340+P316+P320
- **IF IN EYES**: Immediately rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get emergency medical help immediately [for liquid contact]. [For vapor contact], If eye irritation persists: Get medical help. P305+P351+P354+P338+P316+P337+P317
- **IF ON SKIN**: Take off immediately all contaminated clothing. Immediately rinse with water for several minutes. Get emergency medical help immediately. Specific treatment (see First Aid section of label and Section 4 of SDS). Wash contaminated clothing before reuse. P302+P361+P364+P354+P316+P321+P363
- **IF SWALLOWED**: Get emergency medical help immediately. [Dab material from mouth with dry cloth first, if possible] Rinse mouth. Do NOT induce vomiting. Specific treatment (see First Aid section of label and Section 4 of SDS). P301+P316+P330+P331+P321
- **IF** exposed or concerned: Get emergency medical help immediately. P308+P316
- Get medical advice if you feel unwell. P319

Storage [See Section 7 for additional information]

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

Disposal [See Section 13 for additional information]

- Collect spillage. P391
- Dispose of contents and container in accordance with government regulations. P501

Additional Precautionary Statements When Product Under Pressure in Cylinder	Closed cylinders may rupture or burst if heated by fire. • Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P210 • [Store away from combustible materials. P220] • Stop leak if safe to do so. P376 • [In case of fire: Evacuate area. Fight fire remotely due to the risk of cylinder rupture. P370+P380+P375 (modified)]
Hazards Not Otherwise Classified	None.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Identity	Synonyms	CAS Number	Concentration by weight %
Chloropicrin	Trichloronitromethane	76-06-2	100.0 [1, 2]

[1] Product label will reflect nominal active ingredient percentage.
[2] For reporting imports and exports pursuant to Chemical Weapons Convention, use 100% Chloropicrin.

4. FIRST AID MEASURES

Inhalation	Remove victim to fresh air and keep at rest in a position comfortable for breathing. Qualified persons should administer oxygen, if available. If breathing has stopped, give artificial respiration. Symptoms of lung edema (shortness of breath) may develop up to 24 hours after exposure. Immediately call an ambulance if any breathing difficulty persists after removal from exposure area. Call a physician or poison control center for further treatment advice.
Eyes	Hold eyes open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first five minutes; then continue rinsing eyes. Immediately call a physician or poison control center if liquid contact occurs. For vapour contact, if eye irritation persists, get medical advice or attention.

Skin	Remove and isolate contaminated clothing and shoes, and other items covering the skin. Rinse skin immediately with plenty of water for 15-20 minutes. Use soap and water for a final cleanse. Call a physician or Poison Control Center immediately. Aerate and then wash any contaminated clothing or shoes separately before reuse. Dispose of heavily contaminated clothing and shoes.
Ingestion	Immediately call a Poison Control Center or physician. Have victim dab inside mouth with dry cloth or paper towel to remove as much product as possible, then thoroughly rinse with water with mouth lowered towards ground to prevent inadvertent swallowing. Never give anything by mouth to a victim who is unconscious or is having convulsions. Do not induce vomiting without advice from Poison Control Center or physician. If vomiting occurs, keep head low to minimize aspiration of stomach contents.
Most Important Symptoms/Effects, Acute and Delayed	Chloropicrin is a volatile liquid and a potent lachrymator (eye tearing). Early symptoms of overexposure are lachrymation, respiratory distress, and vomiting. Pulmonary edema and pulmonary symptoms may be delayed. Treat symptomatically.
Indication of Immediate Medical Attention or Special Treatment	Obtain medical assistance at once in case of illness or burn after exposure, or if irritation to eyes and respiratory tract persist. Do not allow conditions that could cause further exposure until recovery is complete.
General Advice	Ensure that medical personnel are aware of the material involved, and that they take precautions to protect themselves from exposure to Chloropicrin vapour from victim's clothing or stomach contents. At lower concentrations (73-150 ppb), Chloropicrin behaves as mild sensory irritant. At concentrations above 150 ppb, cough, headache, nausea, and vomiting may occur. These symptoms are temporary and reversible following termination of exposure. See Section 11 Toxicology Section for more information.

5. FIREFIGHTING MEASURES

Suitable Extinguishing Media	All conventional fire extinguishing media are suitable: water spray, dry chemical, carbon dioxide, alcohol-resistant foam.
Unsuitable Extinguishing Media	None
Specific Hazards Arising from the Chemical	• Non-combustible. Substance itself does not burn but may decompose upon heating to produce corrosive, toxic, and/or irritating gases or vapours. • Vapours are not explosive. • Vapours are heavier than air. They can spread along the ground and collect in low or confined areas. • Closed cylinders may rupture or burst if heated by fire. Rapid decomposition may burst closed containers under fire conditions. • **NOTE:** Cylinders containing Chloropicrin are not equipped with relief valves or fusible overpressure devices.
Hazardous Combustion Products	• Carbon monoxide, chlorine, hydrogen chloride, phosgene, nitrosyl chloride, and nitrogen oxides.
Special Protective Equipment	• Wear self-contained breathing apparatus and full turnout gear for fire situations.
Special Protective Actions for Fire Fighters	• Stay upwind. • DO NOT approach containers suspected to be hot. • Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. • Evacuate area at least 150 meters (500 feet), initially. • If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2-mile) in all directions; also consider initial evacuation for 800 meters (1/2-mile) in all directions. • Move containers from fire area if you can do it without risk. • Cool containers with flooding quantities of water until well after fire is out. • For massive fire in cargo area, use unmanned hose holder or monitor nozzles, if possible. If not, withdraw and let fire burn out.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment, and Emergency Procedures	• Use proper personal protective equipment (PPE) as indicated in Section 8. • Do not touch damaged containers or spilled material unless wearing appropriate PPE. • Avoid breathing vapours and contact with skin and eyes. • Keep unnecessary personnel away. • Avoid low places, ventilate closed spaces before entering, and work upwind if possible. • Do not permit entry into the spill or leak area by any person not wearing proper PPE until Chloropicrin is measured to be less than 0.15 ppm. • After clean-up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
Environmental Precautions	• Prevent entry into waterways, sewers, basements, or confined areas. • Contact local authorities in case of spillage to drain/aquatic environment.
Methods and Materials for Containment	• Stop leak if you can do so without risk. • Dike the spilled material where possible with sand, earth, or vermiculite.
Methods for Cleaning Up Small Liquid Spills 55 gallons or less	• Isolate immediate area at least 100 feet (30 m), initially. • Wear recommended PPE. • Chloropicrin readily vaporizes so ensure area is well-ventilated. • Move leaking or damaged cylinders outdoors to an isolated location, if safe to do so. Position cylinder or other packaging to minimize potential for liquid to leak out. • Allow spilled fumigant to evaporate or cover spill with water, soil, or plastic tarp to reduce vapours. • Absorb onto inert material such as vermiculite, dry sand, or dirt, and deposit spill into a sealable polyethylene or steel container that is labeled appropriately. • Ventilate area before allowing re-entry and until the concentration of Chloropicrin is measured to be less than 0.15 ppm.
Methods for Cleaning Up Large Liquid Spills > 55 gallons	• Isolate at least 500 feet (150 m) in all directions, initially. • Wear self-contained breathing apparatus (SCBA) and recommended PPE (see Section 8). • Contain with dike and cover diked area with plastic sheeting or with water to reduce vapours.
Other Information	• For disposal, see Section 13.

7. HANDLING AND STORAGE

PRECAUTIONS FOR SAFE HANDLING

This product is a highly hazardous material and must be handled with care only by those individuals experienced with its proper use. IF THIS PRODUCT IS BEING USED IN THE FIELD, AND THE INFORMATION IN THIS SDS DIFFERS FROM THAT ON THE END USE LABELING FOR THIS PRODUCT, THE HANDLER MUST FOLLOW THE PRECAUTIONARY STATEMENTS ON THE END USE LABELING.

- Wear PPE in accordance with Section 8. Leather or other abrasion resistant gloves can be worn when handling or moving closed and capped cylinders.
- Wash hands and face before eating, drinking, or smoking after handling material. Handle in accordance with good industrial hygiene and safety practice.
- Do not drop, drag, slide or roll cylinders on their sides.
- Ropes, slings, hooks, tongs, and similar handling devices should not be used for unloading cylinders. A suitable hand truck, fork truck, or similar device to which the cylinders can be firmly secured should be used for transporting the heavier cylinders.
- Keep valves closed and secured with the valve cap, when the cylinder is not in use or is empty. Only hand-tighten valves and caps. Leaving an empty cylinder valve open can introduce moisture and increase potential for internal corrosion.
- Use an adjustable strap wrench to remove caps that are over-tightened or rusted. Never insert an object (e.g. wrench, screw driver) into cap openings.
- Ventilation: When possible, open cylinder (slowly) only in a well-ventilated area with the operator “upwind” from the container or provide ventilation to control airborne levels below the permissible exposure limit.
- NOTE: Passing vapours through activated carbon effectively removes Chloropicrin.

- Do not allow to spill.
- Avoid contact with incompatible materials. See Section 10 for specific materials to avoid.
- Do not get in eyes, on skin, on clothing.
- Always have adequate clean water available to wash the skin.
- If product splashes or spills on shoes or clothing, remove them at once. Vapours from contaminated area will be an intolerable source of irritation. If liquid contacts skin where rings or bandages are worn, remove them and wash exposed skin with soap and water. Air expose shoes or clothing outside and do not wear until free of all traces of fumigant. Keep and wash PPE and work clothing separately from other laundry. Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product.
- Keep away from heat or open flame.
- Containers should never be refilled by the consumer or used for any other product or purpose.
- Use only dry nitrogen gas to pressurize cylinders. Polyethylene or Teflon® tubing may be used to transfer Chloropicrin at low pressures. Regulator must be operated with a secondary pressure relief valve. **DO NOT** use high-pressure hose connection (such as stainless-steel braided hose) between nitrogen cylinder and Chloropicrin cylinder.

CONDITIONS FOR SAFE STORAGE

- Cylinders and containers should be tightly closed and stored in a cool, dry, well-ventilated area under lock and key (secured).
- Keep flammable/combustible liquids, oxidizers, and combustible solid materials away from Chloropicrin-containers.
- Store at temperatures not exceeding 55 °C (131 °F).
- Post as a pesticide storage area.
- Do not contaminate water, food, or feed by storage or disposal.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

CONTROL PARAMETERS: OCCUPATIONAL EXPOSURE LIMITS FOR CHLOROPICRIN (CAS 76-06-2)

SOURCE OF EXPOSURE LIMIT	TYPE	VALUE	
South Africa, Regulations for Hazardous Chemical Agents, 2021	OEL-RL	0,2 ppm	1.4 mg/m3
US OSHA, Table Z-1 Limits for Air Contaminants, 29 CFR 1910.1000	TWA	0.1 ppm	0.7 mg/m^3
US ACGIH, Threshold Limit Values (TLVs)	TWA	0.1 ppm	0.67 mg/m^3
US NIOSH, Documentation for Immediately Dangerous to Life or Health	IDLH	2.0 ppm	

BIOLOGICAL LIMIT VALUES

No biological exposure limits noted for Chloropicrin.

EXPOSURE GUIDELINES

None established for components.

ENGINEERING CONTROLS

General Hygiene:	• Wash hands and face before breaks and immediately after handling product. • Handle in accordance with good industrial hygiene and safety practice. • Use personal protective equipment as required. • Keep working clothes separate.
Equipment	Provide easy access to adequate water supply for eye flushing or skin decontamination in the work area. For field handling and application situations, refer to the pesticide end-use label for emergency water requirements.
Ventilation	For indoors, use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Lethal concentrations may exist in areas with poor ventilation.

INDIVIDUAL PROTECTION MEASURES

Eyes/Face	To protect against splash and irritating mists during use or manual handling: • Full-face shield worn over safety glasses with side shields (consistent with EN 166 or equivalent), or • Full-facepiece respirator meeting standard EN 136 with organic vapour cartridge meeting standard EN 14387, or equivalent for either standard. • NOTE: Eye goggles are not to be worn when handling this product.

Skin	Gloves: During handling or use tasks, use chemical-resistant gloves when contact with liquid product is likely. Butyl, Nitrile, Neoprene are acceptable for incidental contact (<10 minutes). Longer-term protection is provided by PPE constructed of Viton, Teflon, and EVAL barrier laminates. See standard EN374 for chemical resistant glove classifications. Clothing: Wear appropriate splash-resistant clothing to prevent skin exposure.
Respiratory NOTE: Only respirators approved by the Minister of Employment and Labor may be used for Respiratory Protection	If working in an environment where the eyes are stinging and watery due to exposure to this product, wear a full-facepiece respirator with an organic vapour cartridge meeting standard EN 14387 or equivalent. For air concentrations greater than 2 ppm (IDLH): • A full-facepiece pressure demand SCBA for a minimum service life of thirty minutes. • A combination full-facepiece pressure demand supplied-air respirator (SAR) with auxiliary self-contained air supply. For emergency or planned entry into unknown concentrations: • A full-facepiece pressure demand SCBA for a minimum service life of thirty minutes. • A combination full-facepiece pressure demand supplied-air respirator (SAR) with auxiliary self-contained air supply. For escape* • Air-purifying respirator equipped with full-facepiece and an organic vapour cartridge. • Any air-purifying hood style CBRN escape-certified respirator. • Air-purifying respirator with canisters that include the escape gas mask (canister) respirator, the gas mask (canister) respirator, and the filter self-rescuer. • Any self-contained breathing apparatus with hood or full-facepiece mask. *Respirators certified "escape only" can only be used for escape purposes and CANNOT be used for responding to emergencies. **When applying as a pesticide, follow end- use pesticide label instructions for respiratory protection.**

Measurement	Air concentration can be measured with a direct reading detection device, such as a Sensidyne or Kitigawa pump, using its Chloropicrin detector tube. (#172S is tube number for Sensidyne).

PERSONAL PROTECTION FOR SPILLS/EMERGENCY

Fire	If fire only, use normal fire-fighting equipment. If chemical releases and fire involved, wear recommended chemical protective clothing in conjunction with fire-fighting gear.
Spills	Minimum PPE: Full-facepiece air-purifying respirator with organic vapour cartridge and chemical resistant gloves. Upgrade respiratory protection in accordance with the "Respiratory" section above.
Chemical Protective Clothing	• For small cleanup where liquid splash is unlikely, loose-fitting or well-ventilated long-sleeved shirt, long pants or coveralls, socks with shoes may be worn. If contact occurs, remove contaminated clothing immediately to prevent skin irritation or burn. • For cleanup where liquid splash is likely, a liquid impervious chemical coverall with booties and head cover may be worn, for example, Tyvek® QC or Saranex™ SL. • In confined areas or areas where substantial vapour levels exist, wear a vapour-tight suit made of a material such as Tychem® TK or Kappler CPF 3. • Use a Dupont™ Responder® level suit or equivalent for use against permeation by Chloropicrin for periods greater than 8 hours. Teflon® withstands permeation from 4 to 8 hours.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Clear, colourless liquid in normal storage. Pale yellow if aged or exposed to air.
Odour	Strong, sharp, irritating (pungent). Chloropicrin is readily identifiable by smell.
Odour Threshold	700 ppb in 2-5 seconds
pH	Not applicable.
Melting Point	-69.2 °C (-92.56 °F)
Freezing Point	-69.2 °C (-92.56 °F)
Boiling Point, Initial	112 °C (233.6 °F) (757 mm Hg, 100.925kPa)
Boiling Range	Not available.

Flammability (solid, liquid, gas)	Liquid that is not capable of being set on fire.
Flash Point	No flash point determined below 100 °C (212 °F).
Flammability Limits in air, Upper % by volume	Not applicable.
Flammability Limits in air, Lower % by volume	Not applicable.
Autoignition Temperature	No ignition occurred when tested up to 402 °C (755 °F).
Evaporation Rate	Fast.
Vapour Pressure	18.3 mm Hg @ 20 °C (68 °F) Volatile 2.2610 kPa @ 20 °C (68 °F) 5.77 mmHg @ 0 °C (32 °F), 79 mmHg @ 50 °C (122 °F)
Vapour Density	5.7 (air = 1)
Relative Density (Specific Gravity)	1.6558 @ 20 °C (68 °F) $H_2O = 1$ 1.69225 @ 0 °C (32 °F)
Density	1.663 kg/L @ 20 °C (68 °F) (13.88 lbs/gal)
Solubility	Slightly in water. 0.16 grams/100 ml Soluble in acetonitrile, hydrocarbon solvents.
Partition Coefficient (n-octanol/water)	2.38 log K_{ow}
Decomposition Temperature	127 °C (261 °F) At its boiling point, Chloropicrin slowly decomposes.
Viscosity (Kinematic)	0.73 mm^2/s @ 20 °C (68 °F); a Newtonian liquid
% Volatile	100
Particle Characteristics	Not applicable for liquids
Molecular Formula	CCl_3NO_2
Molecular Weight	164.37
Critical Pressure	3730 +/- 890 kPa
Critical Temperature	586 +/- 8.5 K
Saturated Vapour Density	0.0068 gm/cc @ 20 °C/Air=1
Specific Heat of Combustion	-1.61 kJ/g
Liquid Surface Tension	32.3 dynes/cm = 0.0323 N/m at 20 °C (68 °F) (not considered to be surface active) 71.0 mN m^{-1}
Latent Heat of Vaporization	103 Btu/lb = 57.3 cal/g = 2.4 X 105 J/kg
Heat of Fusion	48.16 cal/g
Henry's Law Constant	43.84 $Pa.m^3.mol^{-1}$ Moderately volatile (2.15 E-03 atm-M3 mole (estimated)

Conversion

To convert inhalation results for Chloropicrin:

mg/m^3 to ppm	x 0.14875 (NTP)	x 0.13628 (STP)
ppm to mg/m^3	x 6.72 (NTP)	x 7.3380 (STP)

10. STABILITY AND REACTIVITY

Reactivity	• Hazardous polymerization is not known to occur. • Cylinders containing Chloropicrin can rupture or burst when subjected to fire or temperatures above 60 °C (140 °F).
Chemical Stability	• Product is stable under normal temperatures and pressures.
Possibility of Hazardous Reactions	• If heated under confinement, may develop accelerated decomposition.
Conditions to Avoid	• Contamination with water can lead to the generation of corrosive constituents over time. • Unstable under fire conditions. Avoid temperatures above 60 °C (140 °F).
Incompatible Materials	• Do not use with aluminum and its alloys, organic amines, aniline in presence of heat, sodium methoxide, magnesium and its alloys, or alkali metals. • Degrades PVC, dissolves rubber compounds and fiberglass resin, and is mildly corrosive to carbon steel in presence of moisture.
Hazardous Decomposition Products	• Phosgene, hydrogen chloride, carbon monoxide, chlorine, nitrosyl chloride, and nitrogen oxides at high temperatures.
Explodability	• Did not exhibit heat or shock sensitivity when tested per EEC Method A14.

11. TOXICOLOGICAL INFORMATION

Information on Possible Routes of Exposure	• Eyes (primarily due to vapours in air) • Respiratory tract (by inhalation of vapours) • Skin (primarily by contact with liquid) • Ingestion
Signs & Symptoms of Exposure	Vapour Contact: • Eye irritation, stinging, tearing at low concentrations • Throat irritation, coughing • Dripping nasal mucous • Nausea, vomiting, abdominal pain, headache • Dizziness, drowsiness, unconsciousness • Breathing difficulty, cyanosis (bluish looking skin/lips) • Pulmonary edema, and death due to pulmonary edema Liquid Contact: • Skin blistering • Skin, eye, and portal tissue burns

INFORMATION ON TOXICOLOGICAL EFFECTS

Acute Toxicity	May be fatal if inhaled. May be fatal if swallowed. Toxic in contact with skin.

ACUTE TOXICOLOGY STUDIES:

Trichloronitromethane (Chloropicrin) [CAS 76-06-2]

LC_{50}, inhalation rat	18.9 ppm (126.6 mg/L) / 4 hours
LD_{50}, oral rat	37.5 mg/kg/bw, 14-day observation
LD_{50}, dermal rabbit	926 mg/kg, 4 hr, 14-day observation

Trichloronitromethane (Chloropicrin) [CAS 76-06-2] - Human Response Studies

> 2000 ppb / 10 minutes	Life-threatening effects including pulmonary edema can occur.
> 580 ppb / 8 hours	Life-threatening effects including pulmonary edema can occur.
> 300 ppb	Respiratory symptoms may increase in severity and include difficulty breathing.
> 150 ppb	Headache, nausea, and vomiting may occur. These symptoms are temporary and reversible following termination of exposure.
73 to 150 ppb	Mild irritant to eyes and throat.
73 ppb	Sensory irritation threshold (eye irritation).

SHORT TERM (ACUTE, IMMEDIATE), DELAYED, AND CHRONIC (LONG-TERM EFFECTS):

Skin Corrosion/Irritation	Brief contact may cause moderate skin irritation with local redness. Direct contact with liquid can cause irritation, blistering, or burns.
Serious Eye Damage/Irritation	Direct contact with liquid can cause serious eye damage such as burns and can result in permanent damage, such as blindness. Vapour may cause severe lacrimation (tears), eye irritation, redness, slight corneal injury, blurred vision experienced as mild discomfort that stops following termination of exposure.
Respiratory Sensitization	Classification not possible due to data lacking.
Skin Sensitization	Classification not possible due to data lacking.
Mutagenicity	Classification not possible. In vitro studies produced mixed and contradictory results for genetic toxicity and mutation. In vivo studies are negative for mutation, DNA damage and chromosome damage.

Carcinogenicity	Not classified. South African Regulations for Hazardous Chemical Agents 2021 Not listed. IARC - International Agency for Research on Cancer Not listed. NTP - National Toxicology Program Not listed. At least six long-term bioassays have been completed with Chloropicrin to evaluate the potential of this compound to cause chronic and/or carcinogenic effects. Neoplasms were not seen in Chloropicrin-treated animals at an incidence greater than concurrent or historic control animals.
Reproductive Toxicity	Not classified. Inhalation exposure to Chloropicrin of male and female rats in a 2-generation reproductive function study produced an NOAEL of 1.0ppm for systemic toxicity and greater than 1.5ppm for developmental toxicity and reproductive parameters. These data indicate that reproduction fitness is not adversely affected by Chloropicrin inhalation even at systemically toxic levels. Developmental toxicity studies in rats and rabbits conducted by the inhalation route of exposure showed that the NOAEL for maternal toxicity in rats was 0.4ppm and 1.2ppm for fetal toxicity. In rabbits NOAEL for maternal toxicity was 0.4ppm and 1.2ppm for fetal toxicity indicating that the developing fetus is not a target tissue for Chloropicrin toxicity.
Effects on or via Lactation	Not classified.
Specific Target Organ Toxicity (Single Exposure)	Target organs - Respiratory system irritation and circulatory system (hemolysis) by inhalation. Single exposure to high concentration can cause pulmonary edema and damage to bronchial epithelium.
Specific Target Organ Toxicity (Repeated Exposure)	Target organs - Respiratory system inflammation, hemal system effects (decreased hemoglobin and hematocrit values, and liver (vacuolation of periportal hepatocytes). Repeated-Dose Toxicity Subchronic inhalations studies in mice and rats established that respiratory tissue is the target for Chloropicrin inhalation toxicity and that portal-of-entry effects occur in the upper respiratory tissue of animals inhaling Chloropicrin vapour for 90 days at concentrations at or above 0.1ppm (0.67mg/m^3). Long-term Toxicity: Chronic inhalation studies in mice and rats established that the respiratory tissue is the target for Chloropicrin inhalation toxicity and that tissue of the entire respiratory is subject to inflammatory damage. The NOAEL for respiratory system changes in chronic inhalation bioassays is 0.1 ppm for rats and mice.
Aspiration Hazard	Classification not possible due to data lacking.
Ingestion	Ingestion of liquid Chloropicrin can cause burns to and produce permanent damage to the mouth, throat, esophagus and stomach. Ingestion of large quantities of Chloropicrin liquid can be fatal.
Confirmation of exposure	There is no biological indicator for exposure to Chloropicrin.

12. ECOLOGICAL INFORMATION

Ecotoxicity	Very toxic to aquatic life.
Aquatic Toxicity	Acute • EC_{50} = 0.15 mg/L, 48 hr, Daphnia magna (crustacean), acute, static • LC_{50} = 0.0048 mg/L, 96 hr, Oncorhynchus mykiss (rainbow trout), semi-static • E_rC_{50} = 0.00016 mg/L, 72 hr, Selenastrum Capricornutum (algae), static, Growth rate • E_bC_{50} = 0.00011 mg/L, 72 hr, Selenastrum Capricornutum (algae), static, Biomass Chronic • NOEC = 0.0025 mg/L, 90 d growth, Oncorhynchus mykiss (rainbow trout): ELS flow through • NOEC = 0.00427 mg/L, 21 d, Daphnia magna (crustacean): static, reproduction

Terrestrial Toxicity	• Honeybee dermal LD_{50} > 100 µg/L, 48 Hr • Acute avian inhalation NOEC = 96 ppb, 4 hours per day for 5 days • Terrestrial seedling emergence and vegetative vigor NOEC = 100 µg/L air. Exposure 6 hours per day for two days.
Persistence and Biodegradability (Environmental Fate)	• Atmospheric half-life estimated to be 1 day. Initial photolysis products include phosgene and nitrosyl chloride and chlorine; subsequently nitrogen dioxide and dinitrogen tetraoxide. • Aquatic photolysis half-life = 1.3 days • Aerobic soil metabolism half-life = 4.5-10 days; major degradate is carbon dioxide. • Evaporation half- life of Chloropicrin in water (light) = 4.8-9.4 minutes; (dark) 4.1-15.7 minutes).
Bioaccumulative Potential	Due to low log P_{ow} 2.5, chloropicrin is not expected to bioaccumulate. Rapidly degrades.
Mobility in Soil	Data not available.
Other Adverse Effects (i.e. ozone)	Classification is not possible for ozone layer, not listed in Annexes to Montreal Protocol.
Partition Coefficient (n-octanol/water)	2.38 log K_{ow}

13. DISPOSAL CONSIDERATIONS

Cylinder Management	• Cylinders should be returned according to instructions on the cylinder. • Close the valve when the cylinder is empty and install the safety cap(s) and bonnet. • Do not ship cylinders without safety caps or valve protection bonnets. • When a cylinder is partially full and there is no further requirement for the product, contact the registrant or distributor for return instructions.
Refillable Container	• Only the registrant or distributor is allowed to refill pesticide into containers. Do not reuse this container for any other purpose.
Railcar Management	• An extra seal is provided in the railcar dome to be used when returning the railcar. • Contact the distributor for specific return instructions, if necessary.
Safe Handling	• Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a national pollutant discharge elimination system (NPDES) permit. • Do not discharge effluent containing this product to sewer systems.
Disposal of Product	• Do not contaminate water, food, or feed by storage or disposal. Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law. • If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, the Hazardous Waste representative at the nearest EPA Regional Office, or the product manufacturer or distributor for guidance.
Container Disposal	• Containers are the property of the registrant or distributor and must be returned promptly after use for refilling or for cleaning before disposal. • To clean the container before final disposal, remove any remaining liquid, using dry air pressure if necessary. Allow container to aerate for at least 5 days. After aeration, wash container using hot water; then offer container to qualified reconditioner or dispose of as directed by State or local regulations.

14. TRANSPORT INFORMATION

US DOT, TDG, IMDG

UN Number	UN1580
Proper Shipping Name	Chloropicrin
Transport Hazard Class(es)	6.1
Packing Group	I
Toxic-Inhalation Hazard	Yes
Hazard Zone	B
Environmental Hazards	Aquatic
Marine Pollutant	Yes
Hazardous Substance	No Reportable Quantity (RQ) listed for Chloropicrin
Transport in Bulk per IMO Instruments (MARPOL)	Not applicable

Labels/Placards	US DOT: Class 6.1, Poison Inhalation Hazard IMDG, TDG, ADR, United Nations: Class 6.1, Toxic Substances
Air Transport (IATA/ICAO)	Forbidden for any amount
Emergency Guide	154 (NAERG - North American Emergency Response Guide)
IMDG EmS	F-A, S-A (General Fire Schedule, Spillage Schedule Toxic Substances)
Special Precautions For User	Packages must be secured against all movement during transport. Keep markings, labels or placards on package until cleaned and purged of residue including bulk and non-bulk packages. For cylinders, ensure valve is closed and safety cap(s) and valve protection are in place prior to transport.

15. REGULATORY INFORMATION

INTERNATIONAL:

Chemical Weapons Convention: Chloropicrin is listed as a Schedule 3 substance subject to declaration and reporting. To report imports and exports of the Chloropicrin in this product, use 100% to calculate.

REPUBLIC OF SOUTH AFRICA:

Regulation for Hazardous Chemical Agents on 29 March 2021

Hazardous Chemical Substances Regulations, 1995 of the Occupational Health and Safety Act No. 85 of 1993 (amended 2002)

National Road Traffic Act No. 93 of 1996 as amended

Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act No. 36 of 1947 as amended

Globally Harmonized System of classification and labelling of chemicals (GHS) [SANS 10234:2019 (edition-2)]

16. OTHER INFORMATION

HAZARD RATING SYSTEM (USA):

	NFPA 704*
Category	Chloropicrin
Health	4
Flammability	0
Reactivity	3

Hazard Key
4 - Severe
3 - Serious
2 - Moderate
1 - Slight
0 - Minimal

* NFPA 704 - *Standard System for the Identification of the Hazards of Materials for Emergency Response*

ABBREVIATIONS:

ACGIH	American Conference of Governmental Industrial Hygienists
ADR	European Agreement concerning the Internal Carriage of Dangerous Goods by Road
CAS	Chemical Abstracts Service
CBRN	Chemical, Biological, Radiological, and Nuclear
CFR	Code of Federal Regulations
CHEMTREC	Chemical Transportation Emergency Center
EC_{50}	Half Maximal Effective Concentration: concentration of a material in water, a single dose which is expected to cause a biological effect on 50% of a group of test species.
GHS	Globally Harmonized System
IDLH	Immediately Dangerous to Life and Health: the maximum airborne concentration from which one could escape [within 30 minutes] without any escape-impairing symptoms or any irreversible health effects.
IMDG	International Maritime Dangerous Goods
LC_{50}	Lethal Concentration: median dose at which 50% of test animals die from inhalation.
LD_{50}	Lethal Dose: median dose at which 50% test animals die from oral or dermal exposure.
NFPA	National Fire Protection Association
NIOSH	National Institute of Occupational Safety and Health (USA)
NOAEL	No Observable Adverse Effect Level
NOEC	No Observed Effect Concentration
NTP	Normal Temperature and Pressure: 20 ºC and 760 mmHg or 68 ºF and 1 atm
OEL-RL	Occupational Exposure Limit - Restricted Limit, 8-hour TWA

OSHA	Occupational Health and Safety Administration
ppb	Part(s) per billion
ppm	Part(s) per million
PPE	Personal Protective Equipment
STEL	Short Term Exposure Limit: workers can be exposed to a maximum of four STEL periods per 8-hour shift, with at least 60 minutes between exposure periods.
STP	Standard Temperature and Pressure: 0 ºC and 760 mmHg or 32 ºF and 1 atm
TDG	Transport of Dangerous Goods (Canada)
TWA	Time Weighted Average: airborne concentration for a worker in an 8-hour day.
US DOT	United States Department of Transportation

KEY LITERATURE REFERENCES AND SOURCES OF DATA:

- Toxnet - Hazardous Substance Data Base (United States Center for Disease Control)
- OECD eChem portal
- ECHA database (European Chemicals Agency)
- Manufacturer data for US EPA
- Technical Chloropicrin SDS

VERSION 10 DATE: September 10, 2022

Revision History

04-17-13	SDS:	Initial South Africa Version
10-18-13	Section 7:	Removed nitrogen pressure reference
	Section 9:	Corrected decomposition temperature
	Section 10:	Revised possibility of hazardous reactions; added Explodability section information
11-15-14	Section 2:	Relocated hazards not otherwise specified and added information
01-13-15	Section 1:	Revised distributor address
09-01-15	Section 15:	Removed registration number
06-09-17	Section 2:	Revised hazards identification categories and statements; revised first aid measures
	Section 4:	Revised subsections for inhalation, skin, ingestion
	Section 11, 15:	Revised information
07-14-17	Section 1:	Revised other means of identification
01-09-18	Section 1:	Revised Recommended Use information
	Section 3, 15:	Revised composition of ingredients to reflect concentration by weight %
02-15-22	Section 2:	Revised to comply with Regulation for Hazardous Chemical Agents, 2021
	Section 9:	Modified Critical Temperature and Critical Pressure
	Section 11:	Revised Human and Animal Toxicology Studies section - acute dermal toxicity
09-10-22	Section 2:	Revised Acute Toxicity Dermal category and affected statements

WARRANTY

Notice: The information above is believed to be accurate and represents the best information currently available to us. Seller warrants that this product conforms to its chemical description and is reasonably fit for the purposes stated on the label when used in accordance with directions under normal conditions of use, but neither this warranty nor any other warranty of merchantability or fitness for a particular purpose, express or implied, extends to the use of this product contrary to label instructions, or under abnormal conditions, or under conditions not reasonably foreseeable to seller, and buyer assumes the risk of any such use. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential, or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.