SAFETY DATA SHEET

Tri-Form 60

1. IDENTIFICATION

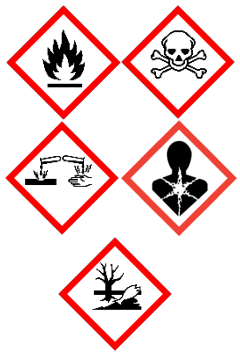
PRODUCT IDENTIFIER:	Tri-Form 60	SDS No.: 160-ZAF-TAF
OTHER MEANS OF IDENTIFICATION:	Chloropicrin and 1,3-Dichloropropene	
RECOMMENDED USE:	Pesticide (Pre-Plant Soil Fumigant)	

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 	H226 Flammable Liquids, Category 3 H330 Acute Toxicity - Inhalation, Category 1 H311 Acute Toxicity - Dermal, Category 3 H301 Acute Toxicity - Oral, Category 3 H314 Skin Corrosion, Category 1C H318 Serious Eye Damage, Category 1 [liquid contact] H319 Eye Irritation, Category 2A [vapour contact] H317 Skin Sensitization, Category 1A H351 Carcinogenicity, Category 2 (oral route) H370 Specific Target Organ Toxicity, Single Exposure, Category 1 (respiratory system/hemal system) H372 Specific Target Organ Toxicity, Repeat Exposure, Category 1 (respiratory system/hemal system/liver) H304 Aspiration Hazard, 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 	H283 Chemicals Under Pressure, Category 2
Signal Word	**DANGER**

GHS Hazard Statements	H226	Flammable liquid and vapour.
	H330	Fatal if inhaled.
	H301+H311	Toxic if swallowed or in contact with skin.
	H314+H318	Causes severe skin burns and eye damage.
	H319	Causes serious eye irritation. [vapour contact]
	H351	May cause an allergic skin reaction.
	H317	Suspected of causing cancer by the oral route.
	H370	Causes damage to the respiratory system and hemal system by inhalation.
	H372	Causes damage to organs through prolonged or repeated exposure.
	H304	May be fatal if swallowed and enters airways.
	H400+H410	Very toxic to aquatic life with long lasting effects.
Additional GHS Hazard Statement When Product Under Pressure in Cylinder	H283	Flammable chemical under pressure: May explode if heated.

GHS PRECAUTIONARY STATEMENTS

Prevention

- Obtain, read, and follow all safety instructions before use.
- Keep away from heat, hot surfaces, sparks, open flames, and other ignition sources. No smoking.
- Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Use non-sparking tools. Take action to prevent static discharges.
- Do not breathe gas or vapours.
- Do not get in eyes, on skin, or on clothing.
- Wash hands and face thoroughly after handling. Do not touch eyes.
- Do not eat, drink, or smoke when using this product.
- Use only outdoors or in a well-ventilated area.
- Contaminated work clothing should not be allowed out of the workplace.
- Wear protective gloves, protective clothing, and eye protection. [See section 8 of SDS.]
- In case of inadequate ventilation, wear respiratory protection. [See section 8 of SDS.]
- Avoid release to the environment, [except for intended use].

Response

- **IF INHALED**: Remove person to fresh air and keep comfortable for breathing. Get emergency medical help immediately.
- **IF IN EYES**: 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 vapour contact], if eye irritation persists, get medical help.
- **IF ON SKIN (or hair)**: Take off immediately all contaminated clothing. Immediately rinse with water for several minutes. Get emergency medical help immediately.
- **IF SWALLOWED**: Get emergency medical help immediately. [Dab material from mouth with dry cloth first, if possible.] Rinse mouth. Do NOT induce vomiting.
- **IF** exposed or concerned: Get emergency medical help immediately.
- Get medical advice if you feel unwell.
- If skin irritation or rash occurs: Get medical help.
- Wash contaminated clothing before reuse.
- In case of fire: Use dry chemical or alcohol-resistant foam to extinguish.

Storage *[See Section 7 for additional information.]*

- Store in a well-ventilated place. Keep container tightly closed. Keep cool. Store locked up.

Disposal *[See Section 13 for additional information.]*

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

Additional Precautionary Statements for Product When it is Under Pressure in Cylinder	[Closed cylinders may rupture or burst if heated by fire.] • Store away from combustible materials. • Do not spray on an open flame or other ignition source. • In case of leakage, eliminate all ignition sources. Stop leak if safe to do so. • In case of fire: Evacuate area. Fight fire remotely [due to the risk of cylinder rupture].

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Identity	Synonyms	CAS #	Concentration by weight %
Chloropicrin	Trichloronitromethane	76-06-2	60.0 [1, 2]
1,3-Dichloropropene (with stabilizer)	1,3-D	542-75-6	40.0

[1] Product label will reflect nominal active ingredient percentages.
[2] For reporting imports and exports pursuant to Chemical Weapons Convention, use 60% 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 with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Do not use mouth-to-mouth method if victim ingested the substance. 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, if available. Call a physician or Poison Control Center for treatment advice. Chemical burns must be treated by a physician. 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	Lachrymator. Early symptoms of exposure to eyes are stinging, tearing, redness, swelling, and blurred vision. Early inhalation symptoms may include throat and nose irritation, nausea or vomiting. May cause an allergic skin reaction, dermatitis or rash. Pulmonary edema and pulmonary symptoms may be delayed. Treat symptomatically. Prolonged exposure may cause chronic effects to skin and respiratory symptoms as noted above.
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. If aspirated into the lungs, material may cause rapid absorption through the lungs which may result in systemic effects. If the product is ingested, probable mucosal damage may contraindicate the use of gastric lavage. Treat the affected person appropriately. In case of ingestion, the decision of whether or not to induce vomiting should be made by the attending physician. Provide general supportive measures and treat symptomatically. Chemical burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. In case of shortness of breath, give oxygen. Keep victim warm. Keep victim under observation. Symptoms may be delayed. Note to Physician: If lavage is performed, endotracheal and/or esophageal control is suggested. Danger from lung toxicity must be weighed against toxicity when considering emptying the stomach.

General Advice	Ensure that medical personnel are aware of the material involved, and that they take precautions to protect themselves from exposure to the product's vapour from victim's clothing or stomach contents. Take off immediately all contaminated clothing. Aerate contaminated clothing and other items such as wallets in a secure area downwind and away from people. Wash contaminated clothing before reuse. Discard any shoes or clothing items that cannot be decontaminated, after aerating.

5. FIRE FIGHTING MEASURES

Suitable Extinguishing Media	All conventional fire extinguishing media are suitable: water spray, dry chemical, carbon dioxide, alcohol-resistant foam.
Unsuitable Extinguishing Media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific Hazards Arising from the Chemical	• Vapours may form explosive mixtures with air. • Vapours may travel considerable distance to a source of ignition and flash back. • During fire, gases hazardous to health may be formed. • Closed cylinders may rupture or burst if heated by fire. • **NOTE:** Per transport regulations, 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.
Precautions for Fire Fighters	• Stay upwind. • In case of fire and/or explosion do not breathe smoke, gas or vapours. • 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	• Immediately evacuate personnel to safe areas and upwind of spill/leak. • For small spill, consider initial isolation for at least 30 meters (100 feet). For large spill, consider initial isolation for at least 60 meters (200 feet). • Keep unnecessary personnel away. • Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). • Avoid low places, ventilate closed spaces before entering, and work upwind if possible. • Avoid breathing vapours and contact with skin and eyes. • Do not touch damaged containers or spilled material unless wearing appropriate PPE as indicated in Section 8. • 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. • Move leaking or damaged cylinders outdoors or to an isolated location, observing strict safety precautions. • 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 or aquatic environment.

Methods and Materials for Containment	• Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Take precautionary measures against static discharge. Use only non-sparking tools. Keep combustibles (wood, paper, oil, etc.) away from spilled material. • 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	• Protect persons downwind 0.1 km (0.1 mi) in daytime. 0.3 km (0.2 mi) in nighttime. • Wear recommended PPE. • Product 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	• Protect persons downwind 0.6 km (0.4 mi) in daytime. 1.0 km (0.6 mi) in nighttime. • Wear self-contained breathing apparatus (SCBA) and recommended PPE (see Section 8). • Stop flow of material, if safe to do so. • Dike the spilled material, where this is possible. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. If not available, you can cover with plastic sheeting to reduce vapours. • Use water spray to reduce vapours or divert vapour cloud drift. Prevent entry into waterways, sewer, basements or confined areas. Following product recovery, flush area with water.
Other Information	• Never return spills to original container for re-use. • 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.

- Do not handle until all safety precautions have been read and understood.
- Wear PPE in accordance with Section 8. Leather or other abrasion resistant gloves can be worn when handling or moving closed and capped cylinders.
- Do not drop, drag, slide or roll cylinders on their sides. Do not subject cylinders to rough handling or to abnormal mechanical shock.
- 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.
- Valve protection caps must remain in place unless container is secured.
- 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.
- Open cylinder valve (slowly) in a well-ventilated area with the operator "upwind" from the container or provide ventilation to control airborne levels below the permissible exposure limit.
- Do not heat container by any means to increase the discharge rate of product from the container.
- Use only dry nitrogen gas to pressurize cylinders. Polyethylene or Teflon® tubing may be used to transfer this product 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 supplying cylinder and this product's cylinder.

- Do not handle, store or open near an open flame, sources of heat, or sources of ignition.
- Take precautionary measures against static discharges.
- Use only outdoors or in a well-ventilated area.
- Do not breathe vapour. Do not get in eyes, on skin, on clothing. Avoid prolonged exposure.
- 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.
- Observe good industrial hygiene practices. When using, do not eat, drink or smoke. Wash hands thoroughly after handling. Wash contaminated clothing before reuse.
- Do not allow to spill.
- Avoid contact with incompatible materials. See Section 10 for specific materials to avoid.
- Containers should never be refilled by the consumer or used for any other product or purpose.
- Do not empty into drains. Avoid release to the environment [except for intended use].

CONDITIONS FOR SAFE STORAGE

- Store locked up.
- Store in original tightly closed container.
- Store in a cool, dry place, out of direct sunlight. Store at temperatures not exceeding 55 °C (131 °F).
- Keep away from heat, sparks and open flame.
- Prevent electrostatic charge build-up by using common bonding and grounding techniques.
- Keep flammable/combustible liquids, oxidizers, and combustible solid materials away from containers.
- Store away from incompatible materials (see Section 10 of the SDS).
- Post as a pesticide storage area.
- Do not contaminate water, food, or feed by storage or disposal.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

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 Eight Hour TWA	0.2 ppm	1.4 mg/m3
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	

OCCUPATIONAL EXPOSURE LIMITS FOR 1,3-DICHLOROPROPENE (CAS 542-75-6)

South Africa, Regulations for Hazardous Chemical Agents, 2021	OEL-RL Eight Hour TWA	2.0 ppm	

BIOLOGICAL LIMIT VALUES

No biological exposure limits noted for the ingredients.

EXPOSURE GUIDELINES

South Africa - Regulations for Hazardous Chemical Agents, 2021	
1,3-Dichloropropene (CAS 542-75-6)	Can be absorbed through the skin.
1,3-Dichloropropene (CAS 542-75-6)	Carcinogenicity
US ACGIH Threshold Limit Values: Skin designation	
1,3-Dichloropropene (CAS 542-75-6)	Can be absorbed through the skin.

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 explosion-proof general and local exhaust ventilation, process enclosures, or other engineering controls to control airborne levels below recommended exposure limits. Good general ventilation (typically 10 air changes per hour) should be used. Lethal concentrations may exist in areas with poor ventilation.

INDIVIDUAL PROTECTION MEASURES

NOTE: Handlers and applicators must follow the end-use pesticide label instructions for each of the task situations that require personal protective equipment.

Eyes/Face	To protect against splash and irritating mists during use or manual handling, wear: • 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 (Silver Shield®). See standard EN374 for chemical resistant glove classifications. Clothing: Wear appropriate splash-resistant clothing to prevent skin exposure. Examples include boots; apron or whole-body suits made of Tychem® and Saranex™.
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 all pesticide handlers (including applicators): • Must wear a half-face air-purifying respirator equipped with an organic-vapour cartridge and a particulate pre-filter. • If sensory irritation (tearing, burning of the eyes or nose) is experienced and handlers remain in the application area, handlers must wear at a minimum either: an EN136 Class 2 certified full-facepiece air-purifying respirator equipped with an organic vapour cartridge and a particulate pre-filter, or a gas mask with a canister approved for organic vapour. Emergency or planned entry into unknown concentrations or IDLH conditions (greater than 2 ppm): • Any self-contained breathing apparatus that has a full-facepiece and is operated in a pressure-demand or other positive-pressure mode certified to EN136 Class 3. Escape: • Air-purifying respirator equipped with full-facepiece and an organic vapour cartridge. • Any air-purifying hood style CBRN escape-certified respirator certified to EN 403. • 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, and 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 product for periods greater than 8 hours. Teflon® withstands permeation from 4 to 8 hours.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Transparent to pale yellow. Brown if in prolonged contact with metal packaging.
Odour	Strong, sharp, irritating (pungent). Chloropicrin in product is readily identifiable by smell.
Odour Threshold	700 ppb in 2-5 seconds [Chloropicrin]
pH	2.6 in 1% v/v aqueous solution
Melting Point	Not available.
Freezing Point	Not available.
Boiling Point, Initial	93 °C (199.4 °F) [Chloropicrin]
Boiling Range	Not available.
Flash Point	49.0 °C (120.2 °F) Tag Closed Cup
Evaporation Rate	Fast.
Flammability (solid, gas)	Flammable liquid.
Flammability Limits in air, Upper % by volume	Not available.
Flammability Limits in air, Lower % by volume	Not available.
Vapour Pressure	15.65 mm Hg @ 20 °C (68 °F) [Chloropicrin] Volatile
Vapour Density	5.7 (air = 1) [Chloropicrin]
Relative Density (Specific Gravity)	1.53 @ 20 °C (68 °F) $H_2O = 1$
Density	1.453 kg/L @ 20 °C (68 °F) [12.13 lbs/gal]
Solubility	Slightly in water. 0.16 grams/100 ml Soluble in acetonitrile, hydrocarbon solvents.
Partition Coefficient (n-octanol/water)	1.82 1,3-Dichloropropene (CAS 542-75-6) 2.38 Chloropicrin (CAS 76-06-2)
Autoignition Temperature	Not available.
Decomposition Temperature	127 °C (261 °F) [for Chloropicrin] At its boiling point, Chloropicrin slowly decomposes.
Viscosity	0.595 cSt @ 40 °C (104 °F) 0.709 cSt @ 20 °C (68 °F)
% Volatile	100

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	• The product is stable and non-reactive under normal conditions of use, storage and transport. • 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	• No dangerous reaction known under conditions of normal use. • Chemical reaction may occur if mixed with or allowed to contact oxidizing agent. • If heated under confinement, may develop accelerated decomposition.

Conditions to Avoid	• Heat may cause the cylinders to rupture or burst. • Avoid heat, sparks, open flames and other ignition sources. • Avoid temperatures exceeding the flash point. • Avoid contact with incompatible materials. • 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, alkali metals, strong oxidizing agents, copper, zinc, cadmium, magnesium, acids, bases. • Degrades PVC, dissolves rubber compounds and fiberglass resin, and is mildly corrosive to carbon steel in presence of moisture. [Chloropicrin]
Hazardous Decomposition Products	• Phosgene, hydrogen chloride, carbon monoxide, carbon dioxide, chlorine, nitrosyl chloride, and nitrogen oxides at high temperatures.

11. TOXICOLOGICAL INFORMATION

[NOTE: Information in this Section is based on the Product unless otherwise indicated.]

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 (causes digestive tract burns)
Signs & Symptoms of Exposure	Early symptoms of low exposure are stinging/tearing of the eyes and irritation of the throat. May cause an allergic skin reaction. Nausea or vomiting may occur. Burning pain and severe corrosive skin damage and eye damage. Vapour Contact in order of increasing exposure levels: • Eye irritation, stinging, tearing, redness, swelling, and blurred vision at low exposure • 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 in order of increasing exposure levels: • Skin redness, blistering, rash, contact dermatitis • Skin, eye, and portal tissue burns

INFORMATION ON TOXICOLOGICAL EFFECTS

Acute Toxicity	Fatal if inhaled. Toxic in contact with skin. Toxic if swallowed.

ACUTE TOXICOLOGY STUDIES:

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

LC_{50}, inhalation rat	18.9 ppm (0.127 mg/L) / 4-hour
LD_{50}, oral rat	37.5 mg/kg/bw, 14-day observation
LD_{50}, dermal rabbit	926 mg/kg, 4-hr, 14-day observation

1,3-Dichloropropene [CAS 542-75-6]

LC_{50}, inhalation rat	2.7 - 3.7 mg/L OECD 403 (1981), 4-hour, vapour
LD_{50}, oral rat	> 150 mg/kg OECD 401 (1981)
LD_{50}, dermal rabbit	> 333 mg/kg OECD 402 (1981)
Irritation (other route)	Irritating to respiratory system

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. May cause drying and flaking of the skin. 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	Not classified.
Skin Sensitization	Animal data indicate that 1,3-Dichloropropene is a potential skin sensitizer and may cause an allergic skin reaction (contact dermatitis).
Mutagenicity	Not classified. Chloropicrin: 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. 1,3-Dichloropropene: In vitro genetic toxicity studies were negative in some cases and positive in other cases. Animal genetic toxicity studies were negative.
Carcinogenicity [Chloropicrin]	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.
Carcinogenicity [1,3-Dichloropropene]	South African Regulations for Hazardous Chemical Agents 2021 Suspected human carcinogen IARC - International Agency for Research on Cancer 2B - Possibly carcinogenic to humans NTP - National Toxicology Program Reasonably Anticipated to be a Human Carcinogen Has been shown to cause cancer in laboratory animals by the oral route. Inhalation exposure resulted in an increase in the normal occurrence of benign lung tumors in male mice.
Reproductive Toxicity	Not classified. Chloropicrin: 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. 1,3-Dichloropropene: In animal studies, did not interfere with reproduction.

Developmental Toxicity	Not classified. Chloropicrin: 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. 1,3-Dichloropropene: Did not cause birth defects or other effects in the fetus even at doses which caused toxic effects in the mother.
Specific Target Organ Toxicity (Single Exposure)	• Respiratory system irritation, lungs. • Single exposure to high concentration can cause pulmonary edema and damage to bronchial epithelium.
Specific Target Organ Toxicity (Repeated Exposure)	Chloropicrin: 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). Chloropicrin: 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. 1,3-Dichloropropene: In animals, effects have been reported on the following organs: Bladder, nasal tissue, liver, lung, gastrointestinal tract, respiratory tract, blood-forming organs (bone marrow & spleen).
Aspiration Hazard	May be fatal if swallowed and enters airways.

12. ECOLOGICAL INFORMATION

NOTE: There is no ecological information for the product. Information below is presented for each of the main components.

CHLOROPICRIN INFORMATION

Ecotoxicity	Very toxic to aquatic life.
Aquatic Toxicity	Fish: • LC_{50} = 0.0048 mg/L, 96 hr, Oncorhynchus mykiss (rainbow trout), semi-static • NOEC = 0.0025 mg/L, 90 d growth, Oncorhynchus mykiss (rainbow trout): ELS flow through Invertebrates: • EC_{50} = 0.15 mg/L, 48 hr, Daphnia magna (crustacean), acute, static • NOEC = 0.00427 mg/L, 21 d, Daphnia magna (crustacean): static, reproduction Algae: • 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 Plants: • E_rC_{50} = 0.0379 mg/L, 7 d, Lemna minor (higher plant), semi-static (Fronds EC_{50})
Terrestrial Toxicity	Bees • LD_{50} = > 100 µg/L, 48 hr, Honeybee dermal Birds • NOEC = 96 ppb, 4 hours per day for 5 days, Acute avian inhalation Vegetation • NOEC = 100 µg/L air, Exposure 6 hours per day for two days, Terrestrial seedling emergence and vegetative vigor.
Persistence and Biodegradability (Environmental Fate)	• Atmospheric half-life estimated to be 1 day. Initial photolysis products include phosgene, 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 K_{ow} (<5.0) Chloropicrin is not expected to bioaccumulate.
Mobility in Soil	Data not available.

Other Adverse Effects (i.e. ozone)	Data not available.
Partition Coefficient (n-octanol/water)	2.38 log K_{ow}

1,3-DICHLOROPROPENE INFORMATION

Ecotoxicity	Material is highly toxic to aquatic organisms on an acute basis.
Aquatic Toxicity	Fish: • LC_{50} = 2.78 mg/L, 96 hr, Oncorhynchus mykiss (Rainbow trout) • LC_{50} = 0.87 mg/L, 96 hr, Cyprinodon variegatus (Sheepshead minnow) • LC_{50} = 3.7 mg/L, 96 hr, Lepomis macrochirus (Bluegill sunfish) • NOEC = 0.0318 mg/L, 33 d, Pimephales promelas (Fathead minnow), flow-through test Invertebrates: • EC_{50} = 3.58 mg/L, 48 hr, Daphnia magna (Water flea) • EC_{50} = 0.64 mg/L, 48 hr, Eastern oyster (Crassostrea virginica) • NOEC = 0.0701 mg/L, 21 d, Daphnia magna (Water flea) Algae: • EbC_{50} = 14.9 mg/L, 72 hr, Pseudokirchneriella subcapitata (Green algae), static test, biomass Plants: • EC_{50} = 2.35 mg/L, 120 hr, diatom Navicula sp. • EC_{50} = 14.56 mg/L, 14 d, Lemna gibba
Terrestrial Toxicity	Birds: • Moderately toxic to birds on an acute basis (LD_{50} between 51 and 500 mg/kg). • Practically non-toxic to birds on a dietary basis (LC_{50} > 5000 ppm). • Oral LD_{50} = 139.8 mg/kg bodyweight, Colinus virginianus (Bobwhite quail), mortality • Dietary LC_{50} = >6243 mg/kg, Anas platyrhynchos (Mallard duck), diet Soil Earthworms: • LC_{50} = 55.6 mg/kg, 14 d, Eisenia fetida
Persistence and Biodegradability (Environmental Fate)	Biodegradation may occur under aerobic conditions (oxygen present). 10-day Window: Fail Biodegradation: 4.9% Method: OECD Test Guideline 301D or Equivalent Theoretical Oxygen Demand 1.281 mg/mg Biological Oxygen Demand 0.148 mg/mg Stability in Water (1/2-life) 2.3 - 4.75 days Photodegradation 7 - 12 hr (Atmospheric 1/2-life)
Bioaccumulative Potential	No data available for this product. For similar material(s): Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Mobility in Soil	Data not available. For similar material(s): Potential for mobility in soil is very high (Koc between 0 and 50). Partition coefficient (Koc): 44.7 Measured
Other Adverse Effects (i.e. ozone)	No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected.
Partition Coefficient (n-octanol/water)	1.82 - 2.1 log K_{ow} (Measured)

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 distributor for return instructions.

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.
Container Reuse	• Do not refill this container with any other product and do not use this container for any purpose other than to transport and lawfully dispense this product.
Disposal of Product	• Follow approved label for Pesticide disposal directions. • Do not contaminate water, food, or feed by storage or disposal of the chemical or its container. Do not allow this material to drain into sewers/water supplies. Pesticide wastes are toxic. Improper disposal of excess pesticide or rinsate is a violation of national law. • If wastes cannot be disposed of by use according to label instructions, contact your Pesticide or Environmental Control Agency, or the product manufacturer or distributor for guidance.
Container Disposal	• Cylinders are the property of the registrant or distributor and must be returned promptly after use for refilling or for disposal. • Since emptied containers, such as drums, may retain product residue, follow pesticide use label instructions to clean container before final disposal, if instructions are provided. Otherwise, contact the product manufacturer or distributor for guidance.

14. TRANSPORT INFORMATION

US DOT, TDG, IMDG

UN Number	UN3489
Proper Shipping Name	Toxic by inhalation liquid, flammable, corrosive, n.o.s. (Chloropicrin; 1,3-Dichloropropene)
Transport Hazard Class(es)	6.1 (3, 8)
Packing Group	I
Toxic-Inhalation Hazard	Yes (relevant for transport in USA)
Hazard Zone	B (relevant for transport in USA)
Environmental Hazards	Aquatic
Marine Pollutant	Yes (Chloropicrin; 1,3-Dichloropropene)
Hazardous Substance (Reportable Quantity - RQ)	100 lbs (45.4 kgs) is RQ for 1, 3-Dichloropropene (relevant for transport in USA)
Transport in Bulk per MARPOL	Not applicable based on intended packaging sizes
Labels/Placards	US DOT: Class 6.1, Poison Inhalation Hazard Class 3 Flammable Liquid, Class 8 Corrosive IMDG, TDG, ADR, United Nations: Class 6.1, Toxic Substances Class 3 Flammable Liquid, Class 8 Corrosive
Air Transport (IATA / ICAO)	Forbidden for any amount
Emergency Guide	Transport Emergency Card for UN1580 ERG 154 (Emergency Response Guide for USA)
IMDG EmS	F-E, S-D (General Fire Schedule, Spillage Schedule Toxic Substances)
Special Precautions	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.
For reporting imports and exports of the Chloropicrin in this product, use 60% to calculate.

REPUBLIC OF SOUTH AFRICA

Regulation for Hazardous Chemical Agents on 29 March 2021, of the Occupational Health and Safety Act No. 85 of 1993

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	2
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
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)
CFR	Code of Federal Regulations
CHEMTREC	Chemical Transportation Emergency Center
DOT	Department of Transportation (USA)
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.
EPCRA	Emergency Planning and Community Right-to-Know
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
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
OSHA	Occupational Health and Safety Administration
ppb	Part(s) per billion
ppm	Part(s) per million
PPE	Personal Protective Equipment
RCP-TWA	Reciprocal Calculation Procedure - Time Weighted Average
RD_{50}	Respiratory Distress in 50% of test animals
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.
TWAEV	Time-Weighted Average Exposure Value: average airborne concentration of a chemical to which a worker may be exposed in a work day.
US DOT	United States Department of Transportation

VERSION 12 DATE: April 06, 2023

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 and 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:	Revised Toxicological Information
	Section 15:	Revised regulatory 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 11:	Revised Human and Animal Toxicology Studies section - acute dermal toxicity
10-26-22	Section 2:	Update in accordance with GHS UN Purple Book, 9th Edition, 2021
04-04-23	Section 2:	Removed Exclamation pictogram
04-06-23	Section 11:	Corrected LC_{50} inhalation value for Chloropicrin

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.