

**Product Name:** GARLON™ 480 EC Herbicide**Issue Date:** 09/28/2012**Print Date:** 08 Nov 2013

Dow AgroSciences SA (Pty) Ltd encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. Identification of the substance/preparation and of the company/undertaking**Product Name**

GARLON™ 480 EC Herbicide

Identified uses

Plant Protection Product

COMPANY IDENTIFICATION

Dow AgroSciences SA (Pty) Ltd
A Subsidiary of Dow AgroSciences LLC U.S.
Private Bag X160
Bryanston, GA 2021
South Africa

SDSQuestion@dow.com**EMERGENCY TELEPHONE NUMBER**

24-Hour Emergency Contact:

+27(0)32 533-0716 / 082-887-8079

POISONINGS:

Tygerberg Poison Information Centre:

+27(0)21 931-6129

Griffon Poison Information Centre:

+27(0)82-446-8946

UOFS Pharmacology/Toxicology information centre:

+27(0)82-491-0160 (08:00-21:00)

2. Composition/information on ingredients

| Component | Amount | Classification: | CAS # | EC # |
|--|---------------|------------------------|--------------|-------------|
| Tricopyr-2-butoxyethyl ester (665 g/l) | 480 g/l | | 64700-56-7 | 265-024-8 |
| Solvent plus inert ingredients | Balance | | | |
| UN NO | 3082 | | | |

See Section 16 for full text of R-phrases.

3. Hazards Identification

Harmful if swallowed.

Irritating to skin.

May cause sensitization by skin contact.

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

4. First-aid measures

Description of first aid measures

General advice: First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Inhalation: Move person to fresh air. If person is not breathing, call an emergency responder or ambulance, then give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask etc). Call a poison control center or doctor for treatment advice.

Skin Contact: Take off contaminated clothing. Wash skin with soap and plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice. Wash clothing before reuse. Shoes and other leather items which cannot be decontaminated should be disposed of properly.

Eye Contact: Hold eyes open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eyes. Call a poison control center or doctor for treatment advice.

Ingestion: Immediately call a poison control center or doctor. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give any liquid to the person. Do not give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed

Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), no additional symptoms and effects are anticipated.

Indication of immediate medical attention and special treatment needed

The decision of whether to induce vomiting or not should be made by a physician. If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. Have the Safety Data Sheet, and if available, the product container or label with you when calling a poison control center or doctor, or going for treatment.

Skin contact may aggravate preexisting dermatitis.

5. Fire Fighting Measures

Suitable extinguishing media

Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.

Special hazards arising from the substance or mixture

Hazardous Combustion Products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Phosgene. Nitrogen oxides. Hydrogen chloride. Carbon monoxide. Carbon dioxide.

Unusual Fire and Explosion Hazards: Container may rupture from gas generation in a fire situation. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. Dense smoke is produced when product burns.

Advice for firefighters

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Consider feasibility of a controlled burn to minimize environment damage. Foam fire extinguishing system is preferred because uncontrolled water can spread possible contamination. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container. Burning liquids may be extinguished by dilution with water. Do not use direct water stream. May spread fire. Move container from fire area if this is possible without hazard. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Review the "Accidental Release Measures" and the "Ecological Information" sections of this (M)SDS.

Special Protective Equipment for Firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

6. Accidental Release Measures

Personal precautions, protective equipment and emergency procedures: Isolate area. Keep unnecessary and unprotected personnel from entering the area. Refer to Section 7, Handling, for additional precautionary measures. No smoking in area. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information. Spills or discharge to natural waterways is likely to kill aquatic organisms.

Methods and materials for containment and cleaning up: Contain spilled material if possible. Small spills: Absorb with materials such as: Clay. Dirt. Sand. Sweep up. Collect in suitable and properly labeled containers. Large spills: Contact Dow AgroSciences for clean-up assistance.

7. Handling and Storage

Handling

General Handling: Keep out of reach of children. Keep away from heat, sparks and flame. Do not swallow. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated contact with skin. Avoid breathing vapor or mist. Use with adequate ventilation. Wash thoroughly after handling. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Other Precautions: Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion. Containers, even those that have been emptied, can contain vapors. Do not cut, drill, grind, weld, or perform similar operations on or near empty containers.

Storage

Store in a dry place. Store in original container. Keep container tightly closed when not in use. Do not store near food, foodstuffs, drugs or potable water supplies.

Avoid temperatures below -10 °C

8. Exposure Controls / Personal Protection

Exposure Limits

| Component | List | Type | Value |
|--|---------|---|--|
| Triclopyr-2-butoxyethyl ester | Dow IHG | TWA | 2 mg/m ³ D-SEN |
| Kerosine (petroleum); Straight run kerosine | Dow IHG | TWA as total hydrocarbon vapor | 10 mg/m ³ SKIN |
| | ACGIH | TWA Non-aerosol. as total hydrocarbon vapor | 200 mg/m ³ SKIN P: Application restricted to conditions in which there are negligible aerosol exposures. |

RECOMMENDATIONS IN THIS SECTION ARE FOR MANUFACTURING, COMMERCIAL BLENDING AND PACKAGING WORKERS. APPLICATORS AND HANDLERS SHOULD SEE THE PRODUCT LABEL FOR PROPER PERSONAL PROTECTIVE EQUIPMENT AND CLOTHING.

A "skin" notation following the inhalation exposure guideline refers to the potential for dermal absorption of the material including mucous membranes and the eyes either by contact with vapors or by direct skin contact.

It is intended to alert the reader that inhalation may not be the only route of exposure and that measures to minimize dermal exposures should be considered.

A D-SEN notation following the exposure guideline refers to the potential to produce dermal sensitization, as confirmed by human or animal data.

Personal Protection

Eye/Face Protection: Use safety glasses (with side shields). Safety glasses (with side shields) should be consistent with EN 166 or equivalent.

Skin Protection: Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task.

Hand protection: Use chemical resistant gloves classified under Standard EN374: Protective gloves against chemicals and micro-organisms. Examples of preferred glove barrier materials include: Chlorinated polyethylene. Neoprene. Nitrile/butadiene rubber ("nitrile" or "NBR"). Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Examples of acceptable glove barrier materials include: Butyl rubber. Natural rubber ("latex"). Polyvinyl chloride ("PVC" or "vinyl"). Viton. When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended. When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended. NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Respiratory Protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process. In misty atmospheres, use an approved particulate respirator. Use the following CE approved air-purifying respirator: Organic vapor cartridge with a particulate pre-filter, type AP2.

Ingestion: Avoid ingestion of even very small amounts; do not consume or store food or tobacco in the work area; wash hands and face before smoking or eating.

Engineering Controls

Ventilation: Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations. Local exhaust ventilation may be necessary for some operations.

9. Physical and Chemical Properties

Appearance

Physical State

Liquid.

| | |
|--|--|
| Color | Yellow |
| Odor | Gasoline-like |
| Odor Threshold | No test data available |
| pH | 6.4 (@ 1 %) <i>pH Electrode</i> 5.3 (@ 100 g/l) <i>pH Electrode</i> |
| Melting Point | No test data available |
| Freezing Point | No test data available |
| Boiling Point (760 mmHg) | No test data available. |
| Flash Point - Closed Cup | 65.5 °C <i>EC Method A9 (CC)</i> |
| Flash Point - Open Cup | 96.5 °C <i>Open Cup</i> |
| Evaporation Rate (Butyl Acetate = 1) | No test data available |
| Flammability (solid, gas) | No |
| Flammable Limits In Air | Lower: No test data available Upper: No test data available |
| Vapor Pressure | No test data available |
| Vapor Density (air = 1) | No test data available |
| Specific Gravity (H₂O = 1) | 1.079 23 °C/4 °C <i>OECD 109</i> |
| Solubility in water (by weight) | emulsifiable |
| Autoignition Temperature | 238 °C |
| Decomposition Temperature | No test data available |
| Dynamic Viscosity | 16.4 mPa.s @ 20 °C |
| Kinematic Viscosity | 11.2 cSt @ 20 °C 7.13 mm ² /s @ 40 °C |
| Explosive properties | No <i>EEC A14</i> |
| Oxidizing properties | No significant increase (>5C) in temperature. |
| Surface tension | 27.0 mN/m @ 25 °C |

10. Stability and Reactivity

Reactivity

No dangerous reaction known under conditions of normal use.

Chemical stability

Thermally stable at typical use temperatures.

Possibility of hazardous reactions

Polymerization will not occur.

Conditions to Avoid: Active ingredient decomposes at elevated temperatures. Generation of gas during decomposition can cause pressure in closed systems.

Incompatible Materials: Avoid contact with: Acids. Bases. Oxidizers.

Hazardous decomposition products

Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Carbon monoxide. Carbon dioxide. Hydrogen chloride. Nitrogen oxides. Phosgene. Toxic gases are released during decomposition.

11. Toxicological Information

Acute Toxicity

Ingestion

Low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury.

As product: LD₅₀, rat, female 1,338 mg/kg

Aspiration hazard

May be harmful if swallowed and enters airways.

Dermal

Prolonged skin contact is unlikely to result in absorption of harmful amounts.

As product: LD50, rabbit > 2,000 mg/kg

Inhalation

No adverse effects are anticipated from single exposure to mist. Mist may cause irritation of upper respiratory tract (nose and throat).

As product: LC50, 4 h, Aerosol, rat > 5.2 mg/l

No deaths occurred at this concentration.

Eye damage/eye irritation

May cause pain disproportionate to the level of irritation to eye tissues. May cause slight eye irritation. Corneal injury is unlikely.

Skin corrosion/irritation

Brief contact may cause slight skin irritation with local redness. May cause drying and flaking of the skin. Repeated contact may cause severe skin irritation with local redness and discomfort.

Sensitization

Skin

Has caused allergic skin reactions when tested in guinea pigs. With the dilute mix, no allergic skin reaction is expected.

Respiratory

No relevant data found.

Repeated Dose Toxicity

Based on available data, repeated exposures are not anticipated to cause additional significant adverse effects.

Chronic Toxicity and Carcinogenicity

Active ingredient did not cause cancer in laboratory animals. In a lifetime animal dermal carcinogenicity study, an increased incidence of skin tumors was observed when kerosene was applied at doses that also produced skin irritation. This response was similar to that produced in skin by other types of chronic chemical/physical irritation. No increase in tumors was observed when non-irritating dilutions of kerosene were applied at equivalent doses, indicating that kerosene is unlikely to cause skin cancer in the absence of long-term continued skin irritation.

Developmental Toxicity

For the active ingredient(s): Has been toxic to the fetus in laboratory animals at doses toxic to the mother. Did not cause birth defects in laboratory animals.

Reproductive Toxicity

For similar active ingredient(s). Triclopyr. In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals. For kerosene: Limited data in laboratory animals suggest that the material does not affect reproduction.

Genetic Toxicology

Based on information for component(s): In vitro genetic toxicity studies were negative. Animal genetic toxicity studies were negative.

12. Ecological Information

Toxicity

Material is very toxic to aquatic organisms (LC50/EC50/IC50 below 1 mg/L in the most sensitive species). Material is slightly toxic to birds on an acute basis (LD50 between 501 and 2000 mg/kg).

Fish Acute & Prolonged Toxicity

LC50, *Oncorhynchus mykiss* (rainbow trout), flow-through test, 96 h: 0.984 mg/l

LC50, *Lepomis macrochirus* (Bluegill sunfish), static test, 96 h: 0.44 mg/l

Aquatic Invertebrate Acute Toxicity

EC50, *Daphnia magna* (Water flea), flow-through test, 48 h, immobilization: 0.35 mg/l

Aquatic Plant Toxicity

EbC50, *Pseudokirchneriella subcapitata* (green algae), biomass growth inhibition, 72 h: 10.6 mg/l

ErC50, *Pseudokirchneriella subcapitata*, static test, Growth rate inhibition, 72 h: 36.7 mg/l

Toxicity to Above Ground Organisms

oral LD50, *Colinus virginianus* (Bobwhite quail): 1350 mg/kg bodyweight.

oral LD50, *Apis mellifera* (bees): > 230 ug/bee

contact LD50, *Apis mellifera* (bees): > 230 ug/bee

Toxicity to Soil Dwelling Organisms

LC50, Eisenia fetida (earthworms), 14 d: 2,552 mg/kg

Persistence and DegradabilityData for Component: **Triclopyr-2-butoxyethyl ester**

Chemical degradation (hydrolysis) is expected in the environment. Material is expected to biodegrade only very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability.

Stability in Water (1/2-life):

8.7 d; 25 °C; pH 7

OECD Biodegradation Tests:

| Biodegradation | Exposure Time | Method | 10 Day Window |
|----------------|---------------|----------------|---------------|
| 18 % | 28 d | OECD 301B Test | pass |

Indirect Photodegradation with OH Radicals

| Rate Constant | Atmospheric Half-life | Method |
|----------------------------|-----------------------|------------|
| 2.3E-11 cm ³ /s | 5.6 h | Estimated. |

Theoretical Oxygen Demand: 1.21 mg/mg

Data for Component: **Kerosine (petroleum); Straight run kerosine**

Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions.

Bioaccumulative potentialData for Component: **Triclopyr-2-butoxyethyl ester**

Bioaccumulation: Bioconcentration potential is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5).

Partition coefficient, n-octanol/water (log Pow): 4.62

Bioconcentration Factor (BCF): 110; fish

Data for Component: **Kerosine (petroleum); Straight run kerosine**

Bioaccumulation: Bioconcentration potential is high (BCF > 3000 or Log Pow between 5 and 7).

Partition coefficient, n-octanol/water (log Pow): 6.1 Measured

Bioconcentration Factor (BCF): 314; Fish; Estimated.

61 - 159; Fish

Mobility in soilData for Component: **Triclopyr-2-butoxyethyl ester**

Mobility in soil: No relevant data found.

Henry's Law Constant (H): 2.9E-03 Pa*m³/mole.

Data for Component: **Kerosine (petroleum); Straight run kerosine**

Mobility in soil: Expected to be relatively immobile in soil (Koc > 5000).

Partition coefficient, soil organic carbon/water (Koc): 5,900 Estimated.

Henry's Law Constant (H): 8.24E+00 atm*m³/mole; 25 °C Measured

13. Disposal Considerations

If wastes and/or containers cannot be disposed of according to the product label directions, disposal of this material must be in accordance with your local or area regulatory authorities. This information presented below only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations. If the material as supplied becomes a waste, follow all applicable regional, national and local laws.

14. Transport Information

ROAD & RAIL

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.

Technical Name: Triclopyr

Hazard Class: 9 **ID Number:** UN3082 **Packing Group:** PG III

Classification: M6

Hazard identification No: 90

Environmental Hazard: Yes

OCEAN

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.

Technical Name: Triclopyr

Hazard Class: 9 **ID Number:** UN3082 **Packing Group:** PG III

EMS Number: F-A,S-F

Marine pollutant.: Yes

AIR

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.

Technical Name: Triclopyr

Hazard Class: 9 **ID Number:** UN3082 **Packing Group:** PG III

Cargo Packing Instruction: 964

Passenger Packing Instruction: 964

Environmental Hazard: Yes

INLAND WATERWAYS

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.

Technical Name: Triclopyr

Hazard Class: 9 **ID Number:** UN3082 **Packing Group:** PG III

Classification: M6

Hazard identification No: 90

Environmental Hazard: Yes

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. Regulatory Information

European Inventory of Existing Commercial Chemical Substances (EINECS)

The components of this product are on the EINECS inventory or are exempt from inventory requirements.

Classification and User Label Information

Hazard Symbol:

Xn - Harmful.

N - Dangerous for the environment.

Risk Phrases :

R22 - Harmful if swallowed.

R38 - Irritating to skin.

R43 - May cause sensitization by skin contact.

R50/53 - Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases :

S24 - Avoid contact with skin.

S35 - This material and its container must be disposed of in a safe way.

S37 - Wear suitable gloves.

S57 - Use appropriate containment to avoid environmental contamination.

To avoid risks to man and the environment, comply with the instructions for use.

Product Registration Number: MAFF 05815/MAPP 13868/PCS No. 91423

16. Other Information

Risk-phrases in the Composition section

R22 Harmful if swallowed.

R38 Irritating to skin.

R41 Risk of serious damage to eyes.

R43 May cause sensitization by skin contact.

R50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

R65 Harmful: may cause lung damage if swallowed.

Revision

Identification Number: 53753 / 3022 / Issue Date 09/28/2012 / Version: 1.0

DAS Code: XRM-4714

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

| | |
|---------|---|
| N/A | Not available |
| W/W | Weight/Weight |
| OEL | Occupational Exposure Limit |
| STEL | Short Term Exposure Limit |
| TWA | Time Weighted Average |
| ACGIH | American Conference of Governmental Industrial Hygienists, Inc. |
| DOW IHG | Dow Industrial Hygiene Guideline |
| WEEL | Workplace Environmental Exposure Level |
| HAZ_DES | Hazard Designation |

Dow AgroSciences SA (Pty) Ltd urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.