



Material Safety Data Sheet

Dow AgroSciences LLC

Product Name: GARLON* 4 Ultra Herbicide

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Dow AgroSciences LLC 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. Product and Company Identification

Product Name

GARLON* 4 Ultra Herbicide

COMPANY IDENTIFICATION

Dow AgroSciences LLC
A Subsidiary of The Dow Chemical Company
9330 Zionsville Road
Indianapolis, IN 46268-1189
USA

Customer Information Number:

800-992-5994

SDSQuestion@dow.com

EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact:

800-992-5994

Local Emergency Contact:

352-323-3500

2. Hazards Identification

Emergency Overview

Color: Yellow

Physical State: Liquid.

Odor: Mild

Hazards of product:

WARNING! May cause allergic skin reaction. May cause eye irritation. May cause skin irritation. May be harmful if swallowed. Isolate area. Toxic fumes may be released in fire situations.

OSHA Hazard Communication Standard

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Potential Health Effects

Eye Contact: May cause slight eye irritation. Corneal injury is unlikely.

Skin Contact: Brief contact may cause moderate skin irritation with local redness. May cause drying and flaking of the skin.

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

Skin Sensitization: Prolonged or frequently repeated skin contact may cause allergic skin reactions in some individuals. Has demonstrated the potential for contact allergy in mice.

Inhalation: Prolonged exposure is not expected to cause adverse effects.

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.

Effects of Repeated Exposure: For the active ingredient(s): In animals, effects have been reported on the following organs: Blood. Kidney. Liver.

Cancer Information: In long-term animal studies with ethylene glycol butyl ether, small but statistically significant increases in tumors were observed in mice but not rats. The effects are not believed to be relevant to humans. If the material is handled in accordance with proper industrial handling procedures, exposures should not pose a carcinogenic risk to man.

Birth Defects/Developmental Effects: For the active ingredient(s): Has been toxic to the fetus in laboratory animals at doses toxic to the mother.

Reproductive Effects: The data presented are for the following material: Triclopyr. In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals.

3. Composition Information

Component	CAS #	Amount
Triclopyr-2-butoxyethyl ester	64700-56-7	60.5 %
Ethylene glycol monobutyl ether	111-76-2	0.5 %
Balance	Not available	39.0 %

4. First-aid measures

Description of first aid measures

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. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

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: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Never 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

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.

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. Water fog, applied gently may be used as a blanket for fire extinguishment.

Extinguishing Media to Avoid: Do not use direct water stream. May spread fire.

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: Nitrogen oxides. Hydrogen chloride. Carbon monoxide. Carbon dioxide. Phosgene.

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.

Advice for firefighters

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. 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. 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. Water fog, applied gently may be used as a blanket for fire extinguishment. 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. 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.

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. See Section 13, Disposal Considerations, for additional information.

7. Handling and Storage

Handling

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

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.

8. Exposure Controls / Personal Protection

Exposure Limits

Component	List	Type	Value
Triclopyr-2-butoxyethyl ester	Dow IHG	TWA	2 mg/m3 D-SEN

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 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).

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. Remove contaminated clothing immediately, wash skin area with soap and water, and launder clothing before reuse or dispose of properly. Items which cannot be decontaminated, such as shoes, belts and watchbands, should be removed and disposed of properly.

Hand protection: Use gloves chemically resistant to this material. Examples of preferred glove barrier materials include: Butyl rubber. Chlorinated polyethylene. Neoprene. Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Examples of acceptable glove barrier materials include: Natural rubber ("latex"). Viton. Polyvinyl chloride ("PVC" or "vinyl"). Nitrile/butadiene rubber ("nitrile" or "NBR"). 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. For most conditions no respiratory protection should be needed; however, if discomfort is experienced, use an approved air-purifying respirator. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

Ingestion: Use good personal hygiene. Do not consume or store food in the work area. Wash hands 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.

9. Physical and Chemical Properties

Appearance

Physical State

Liquid.

Color

Yellow

Odor

Mild

pH

3.36 (@ 1 %) *pH Electrode* (1% aqueous suspension)

Melting Point

Not applicable

Freezing Point

No test data available

Boiling Point (760 mmHg)

No test data available.

Flash Point - Closed Cup

> 100 °C (> 212 °F) *Pensky-Martens Closed Cup ASTM D 93*

Evaporation Rate (Butyl Acetate = 1)

No test data available

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)	1.11 <i>Digital Density Meter (Oscillating Coil)</i>
Solubility in water (by weight)	emulsifies
Partition coefficient, n-octanol/water (log Pow)	No data available for this product.
Autoignition Temperature	> 325 °C (> 617 °F) <i>Literature</i>
Decomposition Temperature	No test data available
Dynamic Viscosity	23.4 mPa.s @ 20 °C
Kinematic Viscosity	No test data available
Liquid Density	1.11 g/cm3 @ 20 °C <i>Digital density meter</i>

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: Exposure to elevated temperatures can cause product to decompose. Generation of gas during decomposition can cause pressure in closed systems.

Incompatible Materials: Avoid contact with: Strong acids. Strong bases. Strong 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: Hydrogen chloride. Nitrogen oxides. Phosgene.

11. Toxicological Information

Acute Toxicity

Ingestion

LD50, Rat, female 3,200 mg/kg

Dermal

LD50, Rat, male and female > 5,000 mg/kg

Inhalation

LC50, 4 h, Aerosol, Rat, male and female > 5.05 mg/l

Eye damage/eye irritation

May cause slight eye irritation. Corneal injury is unlikely.

Skin corrosion/irritation

Brief contact may cause moderate skin irritation with local redness. May cause drying and flaking of the skin.

Sensitization

Skin

Prolonged or frequently repeated skin contact may cause allergic skin reactions in some individuals. Has demonstrated the potential for contact allergy in mice.

Repeated Dose Toxicity

For the active ingredient(s): In animals, effects have been reported on the following organs: Blood. Kidney. Liver.

Chronic Toxicity and Carcinogenicity

In long-term animal studies with ethylene glycol butyl ether, small but statistically significant increases in tumors were observed in mice but not rats. The effects are not believed to be relevant to humans.

If the material is handled in accordance with proper industrial handling procedures, exposures should not pose a carcinogenic risk to man. The data presented are for the following material: Triclopyr. Did not cause cancer in laboratory animals.

Carcinogenicity Classifications:

Component	List	Classification
Ethylene glycol monobutyl ether	ACGIH	Confirmed animal carcinogen with unknown relevance to humans.; Group A3

Developmental Toxicity

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

Reproductive Toxicity

The data presented are for the following material: Triclopyr. In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals. The data presented are for the following material: Butoxyethanol. In animal studies, did not interfere with reproduction. For the minor component(s): Available data are inadequate to determine effects on reproduction.

Genetic Toxicology

For the active ingredient(s): In vitro genetic toxicity studies were negative. For the active ingredient(s): Animal genetic toxicity studies were negative.

12. Ecological Information

Toxicity

Based largely or completely on information for similar material(s). Material is highly toxic to aquatic organisms on an acute basis (LC50/EC50 between 0.1 and 1 mg/L in the most sensitive species tested). Material is slightly toxic to birds on an acute basis (LD50 between 501 and 2000 mg/kg).

Fish Acute & Prolonged Toxicity

For similar material(s): LC50, bluegill (*Lepomis macrochirus*), 96 h: 0.44 - 1.2 mg/l

LC50, rainbow trout (*Oncorhynchus mykiss*), 96 h: 0.98 - 2.6 mg/l

LC50, Atlantic silverside (*Menidia menidia*), 96 h: 0.77 mg/l

Aquatic Invertebrate Acute Toxicity

For similar material(s): EC50, water flea *Daphnia magna*, 48 h, immobilization: 0.35 - 2.0 mg/l

EC50, eastern oyster (*Crassostrea virginica*), 96 h, shell growth inhibition: 0.30 mg/l

LC50, grass shrimp (*Palaemonetes pugio*), 96 h, lethality: > 1.8 mg/l

LC50, water flea *Daphnia magna*, 48 h, lethality: 0.43 mg/l

Aquatic Plant Toxicity

For similar material(s): EbC50, green alga *Pseudokirchneriella subcapitata* (formerly known as *Selenastrum capricornutum*), biomass growth inhibition, 72 h: 11 mg/l

Toxicity to Above Ground Organisms

Based on information for a similar material: oral LD50, bobwhite (*Colinus virginianus*): 1,350 mg/kg

Persistence and Degradability

For similar material(s): Biodegradation under aerobic static laboratory conditions is moderate (BOD20 or BOD28/ThOD between 10 and 40%).

Biological oxygen demand (BOD): For similar material(s):

BOD 5	BOD 10	BOD 20	BOD 28
26 %	36 %		48 %

Bioaccumulative potential

Bioaccumulation: For the active ingredient(s): Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

Mobility in soil

Mobility in soil: For the active ingredient(s): Potential for mobility in soil is low (Koc between 500 and 2000).

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

DOT Non-Bulk
NOT REGULATED

DOT Bulk
NOT REGULATED

IMDG

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

Technical Name: Contains Triclopyr-2-butoxyethyl Ester

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

EMS Number: f-a,s-f

Marine pollutant.: Yes

ICAO/IATA

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

Technical Name: Contains Triclopyr-2-butoxyethyl Ester

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

Cargo Packing Instruction: 964

Passenger Packing Instruction: 964

Additional Information

MARINE POLLUTANT

Contains Triclopyr-2-butoxyethyl Ester

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**OSHA Hazard Communication Standard**

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

Immediate (Acute) Health Hazard	Yes
Delayed (Chronic) Health Hazard	Yes
Fire Hazard	No

Reactive Hazard No
Sudden Release of Pressure Hazard No

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313

This product contains the following substances which are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and which are listed in 40 CFR 372.

Component	CAS #	Amount
Triclopyr-2-butoxyethyl ester	64700-56-7	60.5%

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Hazardous Substances List and/or Pennsylvania Environmental Hazardous Substance List:

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Special Hazardous Substances List:

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Section 103

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)

This product contains no listed substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statute.

Toxic Substances Control Act (TSCA)

All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30

16. Other Information

Hazard Rating System

NFPA Health Fire Reactivity
 2 1 0

Revision

Identification Number: 1001102 / 1016 / Issue Date 09/15/2011 / Version: 5.4

DAS Code: GF-1529

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
Action Level	A value set by OSHA that is lower than the PEL which will trigger the need for activities such as exposure monitoring and medical surveillance if exceeded.

Dow AgroSciences LLC 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.