

**Product Name:** Goal\* 2XL Emulsifiable Concentrate Herbicide**Issue Date:** 2012.09.04

Dow AgroSciences Canada Inc. 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**

Goal\* 2XL Emulsifiable Concentrate Herbicide

**COMPANY IDENTIFICATION**

Dow AgroSciences Canada Inc.  
A Subsidiary of The Dow Chemical Company  
Suite 2100, 450 1<sup>st</sup> Street SW  
Calgary, AB T2P 5H1  
Canada

**For MSDS updates and Product Information:** 800-667-3852**Prepared By:** Prepared for use in Canada by EH&S, Hazard Communications.  
**Revision** 2012.09.04**Customer Information Number:** 800-667-3852  
[solutions@dow.com](mailto:solutions@dow.com)**EMERGENCY TELEPHONE NUMBER****24-Hour Emergency Contact:** 613-996-6666**Local Emergency Contact:** 613-996-6666

## 2. Hazards Identification

**Emergency Overview****Color:** Yellow to brown**Physical State:** Liquid**Odor:** Sweet**Hazards of product:**

**WARNING!** Causes eye irritation. Causes skin irritation. May cause allergic skin reaction. May cause respiratory tract irritation. May cause lung injury. Aspiration hazard. Can enter lungs and cause damage. Isolate area. Keep upwind of spill. Toxic fumes may be released in fire situations. Highly toxic to fish and/or other aquatic organisms. Suspect cancer hazard. May cause cancer.

**Potential Health Effects**

**Eye Contact:** May cause moderate eye irritation which may be slow to heal. May cause slight corneal injury.

**Skin Contact:** Brief contact may cause severe skin irritation with pain and local redness. May cause drying and flaking of the skin. Prolonged contact may cause skin irritation, even a burn.

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

**Skin Sensitization:** Has caused allergic skin reactions when tested in guinea pigs.

**Inhalation:** No adverse effects are anticipated from single exposure to mist. Excessive exposure may cause irritation to upper respiratory tract (nose and throat) and lungs.

**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.

**Aspiration hazard:** Aspiration into the lungs may occur during ingestion or vomiting, causing lung damage or even death due to chemical pneumonia.

**Effects of Repeated Exposure:** For the active ingredient(s): In animals, effects have been reported on the following organs: Liver. Blood. Spleen. Contains component(s) which have been reported to cause effects on the following organs in animals: Blood-forming organs (Bone marrow & Spleen). Excessive exposure may cause hemolysis, thereby impairing the blood's ability to transport oxygen. Liver. Cataracts and other eye effects have been reported in humans repeatedly exposed to naphthalene vapor or dust. Ingestion of naphthalene by humans has caused hemolytic anemia. Central nervous system. Excessive exposure to solvent(s) may cause respiratory irritation and central nervous system depression.

**Cancer Information:** Contains naphthalene which has caused cancer in some laboratory animals. In humans, there is limited evidence of cancer in workers involved in naphthalene production. Limited oral studies in rats were negative.

**Birth Defects/Developmental Effects:** For the active ingredient(s): Has been toxic to the fetus in laboratory animals at doses toxic to the mother. N-methyl pyrrolidone has caused toxic effects to the fetus in laboratory animals at high dose levels with either mild or undetectable maternal toxicity.

**Reproductive Effects:** For the active ingredient(s): In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals.

### 3. Composition/information on ingredients

Component	CAS #	Amount W/W
Oxyfluorfen	42874-03-3	22.3 %
2-Methylnaphthalene	91-57-6	15.0 %
N-Methyl-2-pyrrolidone	872-50-4	10.0 %
Benzenesulfonic acid, dodecyl-, calcium salt	26264-06-2	9.1 %
Naphthalene	91-20-3	8.6 %
1-Methylnaphthalene	90-12-0	7.2 %
Isobutanol	78-83-1	1.6 %
Balance	Not available	26.2 %

Amounts are presented as percentages by weight.

### 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. Suitable emergency safety shower facility should be available in work area.

**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. Suitable emergency eye wash facility should be immediately available.

**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**

Maintain adequate ventilation and oxygenation of the patient. May cause asthma-like (reactive airways) symptoms. Bronchodilators, expectorants, antitussives and corticosteroids may be of help. If burn is present, treat as any thermal burn, after decontamination. If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach. The decision of whether to induce vomiting or not should be made by a physician. Administer 100% oxygen to relieve headache and a general sense of weakness. Determine methemoglobin concentration of blood every 3 to 6 hours for first 24 hours. It should return to normal within 24 hours. The treatment of toxic methemoglobinemia may include the intravenous administration of methylene blue. If methemoglobin >10-20% consider methylene blue 1-2 mg/kg body weight as 1% solution intravenously over 5 minutes followed by 15-30 cc flush (Price D, Methemoglobinemia, Goldfrank Toxicologic Emergencies, 5<sup>th</sup> ed., 1994). Also provide 100% oxygen. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

Repeated excessive exposure may aggravate preexisting lung disease. 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.

**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 fluoride. 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.

See Section 9 for related Physical Properties

## 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. Keep upwind of spill. Ventilate area of leak or spill. 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 contact with eyes, skin, and clothing. Avoid breathing vapor. Avoid prolonged or repeated contact with skin. Use with adequate ventilation. Wash thoroughly after handling. Keep container closed. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

### Storage

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

## 8. Exposure Controls / Personal Protection

### Exposure Limits

Component	List	Type	Value
Oxyfluorfen	Dow IHG	TWA	0.2 mg/m <sup>3</sup>
N-Methyl-2-pyrrolidone	CAD ON OEL	TWAEV	400 mg/m <sup>3</sup>
	AIHA WEEL	TWA	40 mg/m <sup>3</sup> 10 ppm SKIN
Naphthalene	CAD AB OEL	TWA	52 mg/m <sup>3</sup> 10 ppm SKIN
	CAD AB OEL	STEL	79 mg/m <sup>3</sup> 15 ppm SKIN
	CAD BC OEL	TWA	10 ppm SKIN
	CAD BC OEL	STEL	15 ppm SKIN

	CAD ON OEL	TWAEV	52 mg/m <sup>3</sup>	10 ppm
	CAD ON OEL	STEV	78 mg/m <sup>3</sup>	15 ppm
	ACGIH	TWA	10 ppm	SKIN
	ACGIH	STEL	15 ppm	SKIN
	OEL (QUE)	TWA	52 mg/m <sup>3</sup>	10 ppm
	OEL (QUE)	STEL	79 mg/m <sup>3</sup>	15 ppm
<b>Isobutanol</b>	CAD AB OEL	TWA	152 mg/m <sup>3</sup>	50 ppm
	CAD BC OEL	TWA	50 ppm	
	CAD ON OEL	TWAEV	150 mg/m <sup>3</sup>	50 ppm
	ACGIH	TWA	50 ppm	
	OEL (QUE)	TWA	152 mg/m <sup>3</sup>	50 ppm
<b>1-Methylnaphthalene</b>	ACGIH	TWA	0.5 ppm	SKIN
	CAD BC OEL	TWA	0.5 ppm	SKIN
	CAD ON OEL	TWAEV	0.5 ppm	SKIN
<b>2-Methylnaphthalene</b>	ACGIH	TWA	0.5 ppm	SKIN
	CAD BC OEL	TWA	0.5 ppm	SKIN
	CAD ON OEL	TWAEV	0.5 ppm	SKIN

*Consult local authorities for recommended exposure limits.*

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.

## Personal Protection

**Eye/Face Protection:** Use chemical goggles.

**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 gloves chemically resistant to this material. Examples of preferred glove barrier materials include: Chlorinated polyethylene. Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Polyvinyl alcohol ("PVA"). Polyvinyl chloride ("PVC" or "vinyl"). Styrene/butadiene rubber. Viton. Examples of acceptable glove barrier materials include: Butyl rubber. Natural rubber ("latex"). Neoprene. 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:** 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 to brown
Odor	Sweet
Odor Threshold	No test data available
pH	7 <i>pH Electrode</i>
Melting Point	Not applicable
Freezing Point	No test data available
Boiling Point (760 mmHg)	201.7 °C.
Flash Point - Closed Cup	98 °C <i>Setaflash Closed Cup ASTM D3828</i>
Evaporation Rate (Butyl Acetate = 1)	No test data available
Flammable Limits In Air	<b>Lower:</b> 1.3 %(V) Solvent <b>Upper:</b> 11.8 %(V) Solvent
Vapor Pressure	0.29 hPa @ 20 °C
Vapor Density (air = 1)	5.2
Specific Gravity (H <sub>2</sub> O = 1)	1.077 <i>Digital Density Meter (Oscillating Coil)</i>
Solubility in water (by weight)	emulsifiable
Partition coefficient, n-octanol/water (log Pow)	No data available for this product. See Section 12 for individual component data.
Autoignition Temperature	346 °C
Decomposition Temperature	290 °C
Dynamic Viscosity	11.4 mPa.s @ 20 °C
Kinematic Viscosity	No test data available
Liquid Density	1.077 g/cm <sup>3</sup> @ 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:** Some components of this product can decompose at elevated temperatures. Generation of gas during decomposition can cause pressure in closed systems.

**Incompatible Materials:** Avoid contact with: Acids. Amines. Bases. Halogens.

### 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. Hydrogen fluoride. Nitrogen oxides. Toxic gases are released during decomposition.

## 11. Toxicological Information

### Acute Toxicity

#### Ingestion

As product: LD50, rat, female 3,129 mg/kg

#### Dermal

As product: LD50, rat, male and female > 5,000 mg/kg

#### Inhalation

As product: LC50, 4 h, Mist, rat, male and female > 5.12 mg/l

### Eye damage/eye irritation

May cause moderate eye irritation which may be slow to heal. May cause slight corneal injury.

### Skin corrosion/irritation

Brief contact may cause severe skin irritation with pain and local redness. May cause drying and flaking of the skin. Prolonged contact may cause skin irritation, even a burn.

### Sensitization

#### Skin

Has caused allergic skin reactions when tested in guinea pigs.

#### Respiratory

No relevant data found.

### Repeated Dose Toxicity

For the active ingredient(s): In animals, effects have been reported on the following organs: Liver. Blood. Spleen. Contains component(s) which have been reported to cause effects on the following organs in animals: Blood-forming organs (Bone marrow & Spleen). Excessive exposure may cause hemolysis, thereby impairing the blood's ability to transport oxygen. Liver. Cataracts and other eye effects have been reported in humans repeatedly exposed to naphthalene vapor or dust. Ingestion of naphthalene by humans has caused hemolytic anemia. Central nervous system. Excessive exposure to solvent(s) may cause respiratory irritation and central nervous system depression.

### Chronic Toxicity and Carcinogenicity

For the active ingredient(s): An increase in spontaneously occurring tumors observed in mice is of questionable relevance. No increases in tumors were observed in rats. Contains naphthalene which has caused cancer in some laboratory animals. In humans, there is limited evidence of cancer in workers involved in naphthalene production. Limited oral studies in rats were negative.

#### Carcinogenicity Classifications:

Component	List	Classification
Naphthalene	IARC	Possibly carcinogenic to humans.; 2B

### Developmental Toxicity

For the active ingredient(s): Has been toxic to the fetus in laboratory animals at doses toxic to the mother. Active ingredient did not cause birth defects in laboratory animals. For the solvent(s): Did not cause birth defects or any other fetal effects in laboratory animals. N-methyl pyrrolidone has caused toxic effects to the fetus in laboratory animals at high dose levels with either mild or undetectable maternal toxicity.

### Reproductive Toxicity

For the active ingredient(s): In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals.

### Genetic Toxicology

In vitro genetic toxicity studies were negative. Animal genetic toxicity studies were negative. Based on information for component(s): In vitro genetic toxicity studies were negative in some cases and positive in other cases.

## 12. Ecological Information

### Toxicity

#### Data for Component: Oxyfluorfen

Material is practically non-toxic to birds on an acute basis (LD50 > 2000 mg/kg). Material is practically non-toxic to birds on a dietary basis (LC50 > 5000 ppm). Material is very highly toxic to aquatic organisms on an acute basis (LC50/EC50 <0.1 mg/L in the most sensitive species).

#### **Fish Acute & Prolonged Toxicity**

LC50, *Lepomis macrochirus* (Bluegill sunfish), static test, 96 h: 0.21 mg/l

LC50, rainbow trout (*Oncorhynchus mykiss*), static test, 96 h: 0.25 mg/l

#### **Aquatic Invertebrate Acute Toxicity**

EC50, water flea *Daphnia magna*, 48 h: 0.072 mg/l

#### **Aquatic Plant Toxicity**

EC50, *Lemna gibba*, static test, biomass growth inhibition, 14 d: 0.00032 mg/l

EbC50, diatom *Navicula* sp., static test, biomass growth inhibition, 96 h: 0.031 mg/l

EC50, *Pseudokirchneriella subcapitata* (green algae), 10 d: > 0.0029 mg/l

EC50, *Skeletonema costatum*, static test, 120 h: 0.0033 mg/l

#### **Fish Chronic Toxicity Value (ChV)**

*Pimephales promelas* (fathead minnow), flow-through test, 33 d, survival, NOEC:0.038 mg/l

*Pimephales promelas* (fathead minnow), flow-through test, 265 d, survival, NOEC:0.005 mg/l,

LOEC:0.0088 mg/l

*Cyprinodon variegatus* (sheepshead minnow), flow-through test, 34 d, growth, NOEC:0.0047 mg/l, LOEC:0.0089 mg/l

#### **Aquatic Invertebrates Chronic Toxicity Value**

water flea *Daphnia magna*, flow-through test, 21 d, NOEC: 0.013 mg/l

#### **Toxicity to Above Ground Organisms**

LD50, *Colinus virginianus* (Bobwhite quail): > 2,150 mg/kg

LC50, *Anas platyrhynchos* (Mallard duck): > 5,000 mg/kg

oral LD50, *Apis mellifera* (bees): > 100 micrograms/bee

contact LD50, *Apis mellifera* (bees): > 100.0 micrograms/bee

dietary LC50, *Colinus virginianus* (Bobwhite quail): > 5,000 mg/kg

#### **Toxicity to Soil Dwelling Organisms**

LC50, *Eisenia fetida* (earthworms): > 1,000 mg/kg

#### Data for Component: N-Methyl-2-pyrrolidone

Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).

#### **Fish Acute & Prolonged Toxicity**

LC50, *Oncorhynchus mykiss* (rainbow trout), static test, 96 h: > 5,000 mg/l

LC50, *Pimephales promelas* (fathead minnow), static test, 96 h: 1,072 mg/l

#### **Aquatic Invertebrate Acute Toxicity**

EC50, *Daphnia magna* (Water flea), static test, 24 h, immobilization: > 1,000 mg/l

#### **Aquatic Plant Toxicity**

ErC50, *Desmodesmus subspicatus* (green algae), static test, Growth rate inhibition, 72 h: > 500 mg/l

#### **Aquatic Invertebrates Chronic Toxicity Value**

*Daphnia magna* (Water flea), semi-static test, 21 d, NOEC: 12.5 mg/l

#### Data for Component: Benzenesulfonic acid, dodecyl-, calcium salt

Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).

#### **Fish Acute & Prolonged Toxicity**

LC50, *Cyprinus carpio* (Carp), 96 h: 2.8 - 4.2 mg/l

LC50, *Oryzias latipes* (Orange-red killifish), 48 h: 3.0 - 5.3 mg/l



Data for Component: Naphthalene

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).

**Fish Acute & Prolonged Toxicity**

LC50, Oncorhynchus mykiss (rainbow trout), 96 h: 0.11 mg/l

**Aquatic Invertebrate Acute Toxicity**

EC50, Daphnia magna (Water flea), static test, 48 h, immobilization: 1.6 - 24.1 mg/l

Data for Component: 1-Methylnaphthalene

Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).

**Fish Acute & Prolonged Toxicity**

LC50, Pimephales promelas (fathead minnow), static test, 96 h: 6.4 mg/l

**Aquatic Invertebrate Acute Toxicity**

, Daphnia magna (Water flea), static test, 48 h, mortality: 6.5 mg/l

Data for Component: Isobutanol

Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).

**Fish Acute & Prolonged Toxicity**

LC50, Pimephales promelas (fathead minnow), flow-through test, 96 h: 1,430 mg/l

**Aquatic Invertebrate Acute Toxicity**

EC50, Daphnia pulex (Water flea), static test, 48 h, immobilization: 1,100 mg/l

**Aquatic Plant Toxicity**

EbC50, Pseudokirchneriella subcapitata (green algae), static test, biomass growth inhibition, 72 h: 632 mg/l

**Toxicity to Micro-organisms**

IC50; activated sludge, static test, 16 h: > 1,000 mg/l

**Aquatic Invertebrates Chronic Toxicity Value**

Daphnia magna (Water flea), 21 d, number of offspring, NOEC: 20 mg/l

**Persistence and Degradability**Data for Component: Oxyfluorfen

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):**

3.9 d; 20 °C; pH 5 - 9

**OECD Biodegradation Tests:**

Biodegradation	Exposure Time	Method	10 Day Window
1.2 %	28 d	OECD 301D Test	fail

Theoretical Oxygen Demand: 1.305 mg/mg

Data for Component: N-Methyl-2-pyrrolidone

Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. Material is ultimately biodegradable (reaches > 70% biodegradation in OECD test(s) for inherent biodegradability).

**OECD Biodegradation Tests:**

Biodegradation	Exposure Time	Method	10 Day Window
91 %	28 d	OECD 301B Test	pass
> 90 %	8 d	OECD 302B Test	Not applicable
73 %	28 d	OECD 301C Test	Not applicable

**Indirect Photodegradation with OH Radicals**

Rate Constant	Atmospheric Half-life	Method
2.199E-11 cm <sup>3</sup> /s	0.486 d	Estimated.

Theoretical Oxygen Demand: 2.58 mg/mg

Data for Component: Benzenesulfonic acid, dodecyl-, calcium salt

No relevant data found.

**OECD Biodegradation Tests:** For similar material(s):

Biodegradation	Exposure Time	Method	10 Day Window
95 %	28 d	OECD 301E Test	pass

Data for Component: **Naphthalene**

Biodegradation under aerobic static laboratory conditions is high (BOD20 or BOD28/ThOD > 40%).

**Indirect Photodegradation with OH Radicals**

Rate Constant	Atmospheric Half-life	Method
2.16E-11 cm <sup>3</sup> /s	5.9 h	Estimated.

**Biological oxygen demand (BOD):**

BOD 5	BOD 10	BOD 20	BOD 28
57.000 %	71.000 %	71.000 %	

**Theoretical Oxygen Demand:** 3.00 mg/mg

Data for Component: **1-Methylnaphthalene**

Biodegradation under aerobic static laboratory conditions is high (BOD20 or BOD28/ThOD > 40%).

**Biological oxygen demand (BOD):**

BOD 5	BOD 10	BOD 20	BOD 28
62 %	66 %	66 %	

Data for Component: **Isobutanol**

Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.

**OECD Biodegradation Tests:**

Biodegradation	Exposure Time	Method	10 Day Window
70 - 80 %	28 d	OECD 301D Test	pass
90 %	14 d	OECD 301C Test	Not applicable

**Indirect Photodegradation with OH Radicals**

Rate Constant	Atmospheric Half-life	Method
6.88E-12 cm <sup>3</sup> /s	1.55 d	Estimated.

**Biological oxygen demand (BOD):**

BOD 5	BOD 10	BOD 20	BOD 28
64 - 69 %	73 - 79 %	72 - 81 %	

**Chemical Oxygen Demand:** 2.29 mg/mg

**Theoretical Oxygen Demand:** 2.59 mg/mg

**Bioaccumulative potential**Data for Component: **Oxyfluorfen**

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

**Partition coefficient, n-octanol/water (log Pow):** 4.7 Measured

**Bioconcentration Factor (BCF):** 184 - 1,151; Lepomis macrochirus (Bluegill sunfish)

Data for Component: **N-Methyl-2-pyrrolidone**

**Bioaccumulation:** Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

**Partition coefficient, n-octanol/water (log Pow):** -0.38 Measured

Data for Component: **Benzenesulfonic acid, dodecyl-, calcium salt**

**Bioaccumulation:** No relevant data found.

Data for Component: **Naphthalene**

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

**Partition coefficient, n-octanol/water (log Pow):** 3.3 Measured

**Bioconcentration Factor (BCF):** 40 - 300; Fish; Measured

Data for Component: **1-Methylnaphthalene**

**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 Estimated.

**Bioconcentration Factor (BCF):** 200; Fish

Data for Component: Isobutanol**Bioaccumulation:** Bioconcentration potential is low (BCF < 100 or Log Pow < 3).**Partition coefficient, n-octanol/water (log Pow):** 0.76 Measured**Bioconcentration Factor (BCF):** 2; Estimated.**Mobility in soil**Data for Component: Oxyfluorfen**Mobility in soil:** Potential for mobility in soil is slight (Koc between 2000 and 5000).**Partition coefficient, soil organic carbon/water (Koc):** 6,831 **Henry's Law Constant (H):** 2.382E-02 Pa\*m<sup>3</sup>/mole.; 25 °CData for Component: N-Methyl-2-pyrrolidone**Mobility in soil:** Given its very low Henry's constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process., Potential for mobility in soil is very high (Koc between 0 and 50).**Partition coefficient, soil organic carbon/water (Koc):** 21 Estimated.**Henry's Law Constant (H):** 4.46E-08 atm\*m<sup>3</sup>/mole; 25 °C MeasuredData for Component: Benzenesulfonic acid, dodecyl-, calcium salt**Mobility in soil:** No relevant data found.Data for Component: Naphthalene**Mobility in soil:** Potential for mobility in soil is medium (Koc between 150 and 500).**Partition coefficient, soil organic carbon/water (Koc):** 240 - 1,300 Measured**Henry's Law Constant (H):** 2.92E-04 - 5.53E-04 atm\*m<sup>3</sup>/mole; 25 °C Measured**Distribution in Environment: Mackay Level 1 Fugacity Model:**

Air	Water.	Biota	Soil	Sediment
74 %	8.5 %	< 0.01 %	18 %	0.39 %

Data for Component: 1-Methylnaphthalene**Mobility in soil:** No relevant data found.Data for Component: Isobutanol**Mobility in soil:** Potential for mobility in soil is very high (Koc between 0 and 50).**Partition coefficient, soil organic carbon/water (Koc):** 2 Estimated.**Henry's Law Constant (H):** 9.78E-06 atm\*m<sup>3</sup>/mole; 25 °C Measured**Distribution in Environment: Mackay Level 1 Fugacity Model:**

Air	Water.	Biota	Soil	Sediment
32.02 %	67.92 %	0 %	0.03 %	0.03 %

## 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

**TDG Small container**  
NOT REGULATED

**TDG Large container**  
NOT REGULATED

**IMDG****Proper Shipping Name:** ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S**Technical Name:** OXYFLUORFEN, Napthalene**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:** OXYFLUORFEN, Napthalene**Hazard Class:** 9 **ID Number:** UN3082 **Packing Group:** PG III**Cargo Packing Instruction:** 964**Passenger Packing Instruction:** 964**15. Regulatory Information****CEPA - Domestic Substances List (DSL)**

All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

**Hazardous Products Act Information: CPR Compliance**

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

**Hazardous Products Act Information: WHMIS Classification**

This product is exempt under WHMIS.

**Pest Control Products Act Registration number:** 24913

**National Fire Code of Canada**

Not applicable

**16. Other Information****Hazard Rating System**

<b>NFPA</b>	<b>Health</b>	<b>Fire</b>	<b>Reactivity</b>
	3	1	0

**Recommended Uses and Restrictions****Identified uses**

Product use: End use herbicide product

**Revision**

Identification Number: 1006750 / 1023 / Issue Date 2012.09.04 / Version: 4.0

DAS Code: GF-1243

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
VOL/VOL	Volume/Volume

*Dow AgroSciences Canada Inc. 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.*