



**Enforcer D Herbicide
Safety Data Sheet**

Issue Date: 2017-12-20

Supersedes Date: 2017-05-17

{Reserved}

1. Identification

Product Name: Enforcer D Herbicide

PCP Registration No.: 30690

Refer to the approved product label for handling and use instructions.

Product Type: Herbicide

Supplier: Nufarm Agriculture Inc.
Suite 350, 2618 Hopewell Place NE
Calgary, Alberta, T1Y 7J7, Canada
1-800-868-5444

Telephone Numbers: 24 Hour Emergency Response Number, Chemtrec, 1-800-424-9300.
For medical emergencies, ProPharma Group, 1-877-325-1840.
For product and use information, Nufarm Agriculture Inc.,
1-800-868-5444.

2. Hazard Identification

Classified according to UN GHS Version 5.

Physical Hazards:

None

Health Hazards:

Skin irritation	Category 2
Eye irritation	Category 2B
Acute toxicity (Oral)	Category 4
Acute toxicity (Inhalation)	Category 4

Environmental Hazards:

Hazardous to aquatic environment, acute Category 1

Signal Word:

WARNING

Hazard Statements:

Causes skin irritation. Causes eye irritation. Harmful if swallowed. Harmful if inhaled.
Very toxic to aquatic life



Precautionary Statements:

Avoid contact with skin, eyes and clothing. Wear goggles or face shield during mixing/loading. Wear coveralls over a long-sleeved shirt, long pants, socks, shoes and chemical-resistant gloves. Rinse gloves before removal. After use, wash hands and other exposed skin. Remove and wash contaminated clothing before reuse. Avoid breathing spray mist. Use only outdoors or in a well-ventilated area. Do not eat, drink or smoke when using this product. Harmful if swallowed. This product contains an active ingredient and petroleum distillates which are toxic to aquatic organisms.

3. Composition / Information on Ingredients
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Hazardous Components	CAS No.	Wt. %
2,4-D 2-ethylhexyl ester	1928-43-4	31.5-33.5
Chemical Synonyms: 2,4-D 2EH; 2-ethylhexyl (2,4-dichlorophenoxy)acetate		
Bromoxynil octanoate	1689-99-2	24.5-26.0
Chemical Synonyms: 2,6-dibromo-4-cyanophenyl octanoate		
Solvent naphtha (petroleum), heavy aromatic, naphthalene depleted	64742-94-5	21.5-22.5
Fluroxypyr 1-methylheptyl ester	81406-37-3	9.7-10.7
Chemical Synonyms: fluroxypyr MHE; fluroxypyr-meptyl; 1-methylheptyl [(4-amino-3,5-dichloro-6-fluoro-2-pyridinyl)oxy]acetate		

Other ingredients are considered non-hazardous.

Content as Expressed on Product Label
Fluroxypyr, present as 1-methylheptyl ester ... 80 g a.e./L
Bromoxynil, present as octanoate ester ... 190 g/L
2,4-D, present as 2-ethylhexyl ester ... 240 g a.e./L

4. First Aid Measures

If swallowed, call a poison control centre or doctor immediately for treatment advice. Do not induce vomiting unless told to do so by a poison control centre or doctor. Do not give **any** liquid to the person. Do not give anything by mouth to an unconscious person.

If on skin or clothing, take off contaminated clothing. Rinse skin immediately with plenty of water for 15–20 minutes. Call a poison control centre or doctor for treatment advice.

If in eyes, hold eye 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 eye. Call a poison control centre or doctor for treatment advice.

If inhaled, move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Call a poison control centre or doctor for further treatment advice.

Take container, label or product name and Pest Control Product Registration Number with you, when seeking medical attention.

DO NOT induce vomiting. This product contains petroleum distillates. Vomiting may cause aspiration pneumonia. No specific antidote. Employ supportive care. This product may cause mild irritation to the eyes. Overexposure to 2,4-D may cause coughing, burning, dizziness or temporary loss of muscle coordination. Other possible effects of overexposure include fatigue, muscle weakness or nausea. Treatment should be based on judgement of the physician in response to reactions of the patient. Treat symptomatically.

5. Fire-fighting Measures

Extinguishing Media: Water fog, alcohol foam, carbon dioxide, dry chemical.

Special Firefighting Procedures: Firefighters should wear self-contained breathing apparatus and full protective clothing when fighting chemical fires. Minimize and contain water runoff.

Flash Point:..... >100 C

Conditions of Flammability: Not classed as a combustible liquid, but may burn under fire conditions.

Hazardous Decomposition Products: ... Under fire conditions, may produce gases such as hydrogen bromide or other bromine compounds, hydrogen chloride, nitrogen oxides and carbon oxides.

National Fire Protection Association (NFPA) Hazard Rating:

Rating for this product: Health: 2 Flammability: 1 Reactivity: 0
Hazards Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

6. Accidental Release Measures

Use safety equipment and procedures appropriate to the size of the spill. Keep unnecessary people away. Avoid runoff to natural waters and sewers. Surround and absorb spills with inert material such as perlite, sawdust, clay granules, vermiculite, sand or dirt. Contain all affected material in a closed, labeled container for proper disposal. Isolate from other waste materials. Clean contaminated area such as hard surfaces with detergent and water, collecting cleaning solution for proper disposal. Large spills to soil or similar surfaces may necessitate removal of top soil.

7. Handling and Storage

Handling: Avoid contact with skin, eyes and clothing. Wear goggles or face shield during mixing/loading. Wear coveralls over a long-sleeved shirt, long pants, socks, shoes and chemical-resistant gloves. Rinse gloves before removal. After use, wash hands and other exposed skin. Remove and wash contaminated clothing before reuse. Avoid breathing spray mist. Do not eat, drink or smoke when using this product.

Storage: Store the container tightly closed away from seeds, fertilizer, plants and foodstuffs. May be stored at any temperature. Shake well before using.

8. Exposure Controls / Personal Protection

Engineering Controls: Use only outdoors or in a well-ventilated area.

Personal Protective Equipment: Goggles or face shield, coveralls, long-sleeved shirt, long pants, socks, shoes and chemical-resistant gloves. Rinse gloves before removal.

Exposure Guidelines:

Component	TWA*	STEL**	Reference/Note
2,4-D 2-ethylhexyl ester	10 mg/m ³	20 mg/m ³	Adopted limits for 2,4-D acid and its esters
Bromoxynil octanoate	0.21 mg/m ³	N/E	Supplier recommendation
Solvent naphtha (petroleum), heavy aromatic, naphthalene depleted	50 mg/m ³	N/E	Supplier recommendation
Fluroxypyr 1-methylheptyl ester	10 mg/m ³	N/E	Supplier recommendation

*Time-weighted Average, 8-hour unless otherwise noted.

**Short Term Exposure Limit

NE = Not Established

Refer to approved product label for additional exposure control guidance.

9. Physical and Chemical Properties
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NOTE: Physical data are typical values, but may vary from sample to sample. A typical value should not be construed as a guaranteed analysis or as a specification. If no value is determined for the formulation, the value listed is the most relevant value of the predominant ingredient(s).

Appearance (physical state, colour, etc.)	clear amber liquid
Odour	hydrocarbon-like
Odour threshold	not available
pH	3.77 (1% w/w dilution)
Melting point / Freezing point	~-20C
Initial boiling point and boiling range	>185C (bromoxynil octanoate)
Flash point	>100C
Evaporation rate	<0.01 (n-butyl acetate = 1) (solvent)
Flammability (solids, gases)	not applicable
Upper / Lower flammability or explosive limits ...	LEL = 0.7, UEL = 5.6 vol. % in air (solvent)
Vapour pressure	4.0 Pa @ 20C (solvent) < 10 ⁻⁷ Pa @ 25C (bromoxynil octanoate) 4.80 x 10 ⁻⁴ Pa at 25C (2,4-D 2EH) 1.349 x 10 ⁻³ mPa @20C (fluroxypyr MHE)
Vapour density	5.6 @ 101 kPa (air = 1) (solvent)
Relative density	1.156 @ 20C
Solubility(ies)	negligible in water, emulsifiable highly soluble in organic solvents
Partition coefficient: n-octanol/water	logP = 5.9 @ pH 7, 25C (bromoxynil octanoate)

logP = 5.78 @ 25C (2,4-D 2EH)
logP = 5.04 @ pH 7 (fluroxypyr MHE)

Autoignition temperature not available
Decomposition temperature >60C (fluroxypyr MHE)
Viscosity (kinematic) 38.88 cSt @ 20C

10. Stability and Reactivity

Reactivity: Not reactive.

Chemical Stability: Stable under normal handling and storage conditions.

Possibility of Hazardous Reactions: Hazardous polymerization will not occur.

Conditions to Avoid: Excessive heat. Do not store near heat or flame.

Incompatible Materials: Avoid contact with strong acidic, basic or oxidizing agents.

Hazardous Decomposition Products: Under fire conditions, may produce gases such as hydrogen bromide or other bromine compounds, hydrogen chloride, nitrogen oxides and carbon oxides.

11. Toxicological Information

Likely routes of exposure: Inhalation, ingestion, skin and eye contact.

Eye contact: Causes eye irritation.

Skin contact: Causes skin irritation.

Ingestion: Harmful if swallowed. May cause headache, dizziness, nausea, vomiting, gastrointestinal irritation, abdominal pain, central nervous system depression, temporary loss of muscle coordination, decreased blood pressure, fatigue, muscle weakness, muscle spasms, unconsciousness, respiratory failure, or in extreme cases, death.

Inhalation: Harmful if inhaled. Vapours could cause coughing, burning, headache, dizziness, respiratory irritation and symptoms similar to those from ingestion.

Medical Conditions Aggravated by Exposure: Skin exposure may aggravate preexisting skin conditions. Inhalation of mist may aggravate preexisting respiratory conditions.

Toxicological Data:

Acute oral LD₅₀ (mg/kg) 1030 mg/kg (Rat, female)

Acute dermal LD₅₀ (mg/kg) >5000 (Rat, male & female)

Acute inhalation LC₅₀ (mg/l) >2.1 (Rat, male & female, 4-hour, nose-only exposure)

Skin corrosion/irritation Moderately irritating to skin (Rabbit)

Serious eye damage/irritation Irritating to the eye (Rabbit)

Respiratory or skin sensitization ... Not considered as a contact dermal sensitizer (Guinea pig)

Germ cell mutagenicity The weight of evidence is that 2,4-D and bromoxynil are not mutagenic. Fluroxypyr shows no evidence of genotoxicity. Products similar to the hydrocarbon component are not considered to be mutagenic.

Carcinogenicity Bromoxynil phenol has been classified by U.S. EPA in Group C, possible human carcinogen. The International Agency for Research on Cancer (IARC) lists exposure to 2,4-D as possibly carcinogenic to humans (Group 2B), based on inadequate evidence in humans and limited evidence in animals. 2,4-D was not carcinogenic to rats or mice

in lifetime feeding studies. Fluroxypyr shows no evidence of carcinogenicity. Products similar to the hydrocarbon component are not considered to be mutagenic and are unlikely to cause tumors.

Reproductive toxicity Animal reproduction studies with bromoxynil phenol and bromoxynil octanoate indicate there is no increased sensitivity of the young relative to maternal animals. 2,4-D is not considered a reproductive toxin. Fluroxypyr shows no evidence of reproductive toxicity.

12. Ecological Information

Ecotoxicity:

Data are from laboratory studies conducted on 2,4-D 2-ethylhexyl technical.

Aquatic Invertebrate: 48-Hour EC₅₀ (mg/L) 5.2 (*Daphnia*)

Fish: 96-Hour LC₅₀ (mg a.e./L) .. 7.2 (Rainbow Trt), >5 (Bluegill), 0.24 (Tidewater Silverside)

Algae: 120-Hour EC₅₀ (mg/L) >30 (*Selenastrum*), 4.1 (*Navicula*), 0.23 (*Skeletonema*)

Birds: Oral LD₅₀ (mg/kg) 663 (Mallard), Dietary LC₅₀ (5-day) >5620 ppm (Mallard, Bobwhite)

Bees: Oral and Contact LD₅₀ >100 µg/bee

Data are from laboratory studies conducted on bromoxynil octanoate technical.

Aquatic Invertebrate: 48-Hour EC₅₀ (mg/L) 0.46 (*Daphnia*)

Fish: 96-Hour LC₅₀ (mg/L) 0.041 (Rainbow Trout), 0.06 (Bluegill Sunfish)

Algae: 120-Hour EC₅₀ (mg/L) 0.22 (*Selenastrum*), 0.043 (*Navicula*)

Birds: Oral LD₅₀ (mg/kg) 170 (Bobwhite), 2350 (Mallard); 5-d Dietary LC₅₀ (ppm) 1315 (Bobwhite), 2150 (Mallard)

Bees: LD₅₀ >100 µg/bee (48 h contact), >119.8 µg/bee (96 h oral)

Data are for fluroxypyr 1-methylheptyl ester technical, from published sources.

Aquatic Invertebrate: 48-Hour EC₅₀ (mg/L) >0.09 (solubility limit) (*Daphnia*)

Fish: 96-Hour LC₅₀ (mg/L) >0.09 (solubility limit) (Rainbow Trout)

Algae: 120-Hour EC₅₀ (mg/L) >0.09 (solubility limit) (*Selenastrum*), 0.093 (*Navicula*)

Birds: Oral LD₅₀ (mg/kg) >2000 (Mallard and Bobwhite)

Bees: Oral and Contact LD₅₀ >100 µg/bee

Persistence and Degradability: In aerobic soil and water, 2,4-D 2EH is rapidly hydrolysed to 2,4-D acid, DT₅₀ <1 day. 2,4-D is microbially degraded with typical half-life (ester and acid) of 5 to 10 days. Persistent in anaerobic environments. Bromoxynil octanoate degrades readily to bromoxynil phenol by abiotic hydrolysis, photolytic degradation, and microbially-mediated metabolism, in both aerobic and anaerobic environments. Representative soil half-lives are 2 days for the octanoate and 14 days for the phenol. Fluroxypyr MHE is rapidly converted to fluroxypyr acid in all soil types. Fluroxypyr is degraded microbially with representative soil half-lives for fluroxypyr MHE and acid of 11 to 38 days.

Mobility in Soil: 2,4-D and bromoxynil have moderate to high mobility potential, but are rapidly degraded. Field studies with fluroxypyr demonstrate no evidence of significant leaching.

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Bioaccumulation Potential: 2,4-D and fluroxypyr have negligible potential. Bromoxynil octanoate can bioaccumulate, but will deplete.

13. Disposal Considerations

For information on disposal of unused, unwanted product, contact the manufacturer or the provincial regulatory agency. Disposal should be made in accordance with federal, provincial and local regulations.

Do not reuse container for any purpose. If applicable, return container in accordance with return program. If a recyclable container, dispose of at a container collection site. Contact local distributor, dealer or municipality for the location of the nearest collection site. Before taking the container to the collection site, triple or pressure rinse the empty container adding rinsings to spray tank, and make container unsuitable for further use. If there is no container collection site in your area, dispose of the container in accordance with provincial requirements.

14. Transport Information

Canadian TDG Description (Road & Rail):

UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S., (2,4-D Ester, bromoxynil, fluroxypyr), Class 9, PG III

Marine pollutant.

Section 1.45.1 of the TDG Regulations provides an exemption from documentation and safety marks only for this product and only when transported by a road or railway vehicle.

United States DOT Description:

< 33 gallons per completed package

Non Regulated

≥ 33 gallons and ≤ 119 gallons per completed package

UN 3082, Environmentally hazardous substance, liquid, n.o.s., (2,4-D acid), 9, III, RQ

> 119 gallons per completed package

UN 3082, Environmentally hazardous substance, liquid, n.o.s. (2,4-D acid, Bromoxynil Octanoate), 9, III, RQ, Marine Pollutant

IMDG

UN 3082, Environmentally hazardous substance, liquid, n.o.s. (2,4-D acid, Bromoxynil Octanoate), 9, III, , Marine Pollutant

IATA

UN 3082, Environmentally hazardous substance, liquid, n.o.s.
(2,4-D Salt), 9, III, Marine Pollutant

15. Regulatory Information

Pest Control Products Act Registration Number: 30690

Read the approved label, authorized under the *Pest Control Products Act*, prior to using or handling the pest control product.

This chemical is a pest control product registered by Health Canada Pest Management Regulatory Agency and is subject to certain labelling requirements under the *Pest Control Products Act*. These requirements differ from the classification criteria and hazard information required for GHS-consistent safety data sheets. Following is the hazard information required on the pest control product label:



WHMIS exempt.

16. Other Information

This Safety Data Sheet (SDS) is designed to comply with the Globally Harmonized System (GHS) of classification, and the *Hazardous Products Regulations*.

This SDS provides important health, safety and environmental information for employers, employees, emergency responders and others handling large quantities of the product in activities generally other than product use. The product labeling provides that information specifically for product use as intended.

Company and published information is used in the development of this SDS. The information herein is presented in good faith and believed accurate at the date of publication. However, no warranty, expressed or implied, is given.

Revisions to the last issue: Addition of PMRA guidance info to Section 15.