1. PRODUCT AND COMPANY IDENTIFICATION

Product Identifier

Product Name Marvel™ Herbicide

Other means of identification

Product Code(s) 7206-A

Synonyms Fomesafen: 5-(2-chloro-α,α,α-trifluoro-p-tolyloxy)-N-mesyl-2-nitrobenzamide;

FLUTHIACET-METHYL: Acetic acid, [2-chloro-4-fluoro-5-[(tetrahydro-3-oxo-1H,3H-[1,3,4] thiadiazolo [3,4-alpha] pyridazin-1-ylidene) amino] phenyl] thio]-, methyl ester (CAS); methyl [(2-chloro-4-fluoro-5-[(1E)-3-oxo-5,6,7,8-tetrahydro-1H,3H-[1,3,4]thiadiazolo[3,4-a]pyridazin-1-ylidene]amino) phenyl)sulfanyl]acetate (IUPAC)

Active Ingredient(s) Fomesafen; Fluthiacet-methyl

Chemical Family Imine chemicals; Thiadiazoles

Recommended use of the chemical and restrictions on use

Recommended Use: Herbicide

Restrictions on Use: Use as recommended by the label

Manufacturer Address

FMC Corporation
2929 Walnut Street
Philadelphia, PA 19104
(215) 299-6000 (General Information)
medsinfo@fmc.com (E-Mail General Information)

Emergency telephone number

Medical Emergencies:
1 800 / 331-3148 (PROSAR - U.S.A. & Canada)
1 651 / 632-6793 (PROSAR - All Other Countries - Collect)
For leak, fire, spill or accident emergencies, call:
1 800 / 424 9300 (CHEMTREC - U.S.A.)
1 703 / 527 3887 (CHEMTREC - Collect - All Other Countries)

2. HAZARDS IDENTIFICATION

Classification

OSHA Regulatory Status

This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute toxicity - Inhalation (Dusts/Mists) Category 4
Marvel™ Herbicide

Carcinogenicity

Category 2

Specific target organ toxicity (repeated exposure)

Category 1

GHS Label elements, including precautionary statements

**EMERGENCY OVERVIEW**

**Hazard Statements**

H332 - Harmful if inhaled
H351 - Suspected of causing cancer
H372 - Causes damage to organs through prolonged or repeated exposure

**Precautionary Statements - Prevention**

P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P281 - Use personal protective equipment as required
P271 - Use only outdoors or in a well-ventilated area
P260 - Do not breathe dust/fume/gas/mist/vapors/spray
P264 - Wash face, hands and any exposed skin thoroughly after handling
P270 - Do not eat, drink or smoke when using this product

**Precautionary Statements - Response**

P308 + P313 - If exposed or concerned: Get medical advice/attention
P304 + P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing

**Precautionary Statements - Storage**

P405 - Store locked up

**Precautionary Statements - Disposal**

P501 - Dispose of contents/container to an approved waste disposal plant

**Hazards not otherwise classified (HNOC)**

No hazards not otherwise classified were identified.

**Other Information**

Very toxic to aquatic life with long lasting effects. May be harmful in contact with skin. May be harmful if swallowed.

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

**Chemical Family**

Imine chemicals; Thiadiazoles.

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluthiacet-methyl</td>
<td>117337-19-6</td>
<td>1.2</td>
</tr>
<tr>
<td>Fomesafen</td>
<td>72178-02-0</td>
<td>30.08</td>
</tr>
<tr>
<td>Propylene glycol</td>
<td>57-55-6</td>
<td>5-10</td>
</tr>
<tr>
<td>n-Butanol</td>
<td>71-36-3</td>
<td>1-5</td>
</tr>
</tbody>
</table>
4. FIRST AID MEASURES

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

**Inhalation**
Move to fresh air. If person is not breathing, call 911 (within the U.S. and Canada) or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Call a poison control center or doctor for further 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 a poison control center or doctor. Do not give anything by mouth to an unconscious person.

**Most important symptoms and effects, both acute and delayed**
Slight irritation.

**Indication of immediate medical attention and special treatment needed, if necessary**
Treat symptomatically.

5. FIRE-FIGHTING MEASURES

**Suitable Extinguishing Media**
Foam. Carbon dioxide (CO₂). Dry chemical. Water spray or fog.

**Specific Hazards Arising from the Chemical**

**Explosion data**

**Sensitivity to Mechanical Impact**
Not sensitive.

**Sensitivity to Static Discharge**
Not sensitive.

**Protective equipment and precautions for firefighters**
As in any fire, wear self-contained breathing apparatus and full protective gear. Isolate fire area. Evaluate downwind.

6. ACCIDENTAL RELEASE MEASURES

**Personal Precautions**
Isolate and post spill area. Remove all sources of ignition. Wear suitable protective clothing, gloves and eye/face protection. For personal protection see section 8.

**Other**
For further clean-up instructions, call FMC Emergency Hotline number listed in Section 1 “Product and Company Identification” above.

**Environmental Precautions**
See Section 12 for additional Ecological Information.

**Methods for Containment**
Dike to prevent runoff. Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal.

**Methods for cleaning up**
Clean and neutralize spill area, tools and equipment by washing with bleach water and soap. Absorb rinsate and add to the collected waste. Waste must be classified and labeled prior to recycling or disposal. Dispose of waste as indicated in Section 13.

7. HANDLING AND STORAGE

**Handling**
Do not contaminate other pesticides, fertilizers, water, food, or feed by storage or disposal.

**Storage**
Keep in a dry, cool and well-ventilated place. Keep away from open flames, hot surfaces and sources of ignition. Keep out of reach of children and animals. Keep/store only in
original container.

Incompatible products  
Alkalis, Oxidizing agents

### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

#### Control parameters

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH</th>
<th>Mexico</th>
</tr>
</thead>
</table>
| n-Butanol     | TWA: 20 ppm | TWA: 100 ppm  
(71-36-3)  
TWA: 300 mg/m³ | IDLH: 1400 ppm  
Ceiling: 50 ppm  
Ceiling: 150 mg/m³ | Mexico: Ceiling 50 ppm  
Mexico: Ceiling 150 mg/m³ |
| Chemical name | British Columbia | Quebec | Ontario TWAEV | Alberta |
| Propylene glycol | - | - | TWA: 10 mg/m³  
(57-55-6)  
aerosol only | -  
TWA: 50 ppm  
aerosol and vapor |
| n-Butanol     | TWA: 15 ppm  
(71-36-3)  
Ceiling: 30 ppm | Ceiling: 50 ppm  
Ceiling: 152 mg/m³  
Skin | TWA: 20 ppm  
TWA: 20 ppm  
TWA: 60 mg/m³ |  
|  

**Appropriate engineering controls**

**Engineering measures**  
Apply technical measures to comply with the occupational exposure limits. Ensure adequate ventilation, especially in confined areas. When working in confined spaces (tanks, containers, etc.), ensure that there is a supply of air suitable for breathing and wear the recommended equipment.

**Individual protection measures, such as personal protective equipment**

**Eye/Face Protection**  
For dust, splash, mist or spray exposure, wear chemical protective goggles.

**Skin and Body Protection**  
Wear long-sleeved shirt, long pants, socks, and shoes.

**Hand Protection**  
Protective gloves

**Respiratory Protection**  
For dust, splash, mist or spray exposures wear a filtering mask.

**Hygiene measures**  
Clean water should be available for washing in case of eye or skin contamination. Wash skin prior to eating, drinking, chewing gum or using tobacco. Shower or bathe at the end of working. Remove and wash contaminated clothing before re-use. Launder work clothing separately from regular household laundry.

**General information**  
If the product is used in mixtures, it is recommended that you contact the appropriate protective equipment suppliers. These recommendations apply to the product as supplied.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

**Information on basic physical and chemical properties**

| Appearance | White to off-white Liquid |
| Physical State | Liquid |
| Color | White to off white |
| Odor | No information available |
| Odor threshold | No information available |
10. STABILITY AND REACTIVITY

Reactivity None under normal use conditions

Chemical Stability Stable under recommended storage conditions.
Possibility of Hazardous Reactions None under normal processing.
Hazardous polymerization Hazardous polymerization does not occur.

Conditions to avoid None known
Incompatible materials Alkalis, Oxidizing agents.
Hazardous Decomposition Products Carbon oxides (COx).

11. TOXICOLOGICAL INFORMATION

Product Information

LD50 Oral 3129 mg/kg (rat)
LD50 Dermal > 2002 mg/kg (rat)
LC50 Inhalation > 2.05 mg/L (rat) (4-hr)

Serious eye damage/eye irritation Slight irritation (rabbit).
Skin corrosion/irritation Slightly irritating (rabbit).
Sensitization Non-sensitizing.

Information on toxicological effects

Symptoms Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Chronic toxicity Prolonged exposure may cause chronic effects. Fomesafen: Prolonged exposure may cause adverse liver effects.
Mutagenicity Fomesafen, Fluthiacet-methyl: Not genotoxic in laboratory studies.
Carcinogenicity Fomesafen caused increased incidents of benign and malignant liver tumors in mice at the highest dose tested. This highest dose also caused an increase in mortality. No carcinogenic effects we observed in rats. Fluthiacet-methyl caused increases in benign pancreatic tumors in male rats at the highest dose, along with pancreatic and liver toxicity.
There was an increase in liver tumors at two highest doses in male mice, along with hepatotoxicity, that could both be secondary to liver toxicity. New data indicates that there is no human risk.

### Neurological effects
Fomesafen, Fluthiacet-methyl: Not neurotoxic

### Reproductive toxicity
Fomesafen, Fluthiacet-methyl: No toxicity to reproduction in animal studies.

### Developmental toxicity
Fomesafen: Not teratogenic in animal studies. Fluthiacet-methyl: A slight delay in fetal development in the rat, with no effects in the rabbit.

### STOT - single exposure
Not classified.

### STOT - repeated exposure
Causes damage to organs through prolonged or repeated exposure. See listed target organs below.

### Target organ effects
Fomesafen: Liver. Fluthiacet-methyl: Liver, bone marrow, spleen, pancreas, lymphatic system, hematopoietic system, uterus and blood.

### Neurological effects
Fomesafen, Fluthiacet-methyl: Not neurotoxic

### Aspiration hazard
No information available.

### 12. ECOLOGICAL INFORMATION

#### Ecotoxicity

<table>
<thead>
<tr>
<th>Active Ingredient(s)</th>
<th>Duration</th>
<th>Species</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluthiacet-methyl</td>
<td>72 h LC50</td>
<td>Algae</td>
<td>0.00251</td>
<td>mg/L</td>
</tr>
<tr>
<td>Fluthiacet-methyl</td>
<td>96 h LC50</td>
<td>Fish</td>
<td>0.043</td>
<td>mg/L</td>
</tr>
<tr>
<td>Fluthiacet-methyl</td>
<td>48 h EC50</td>
<td>Crustacea</td>
<td>2.3</td>
<td>mg/L</td>
</tr>
<tr>
<td>Fluthiacet-methyl</td>
<td>21 d NOEC</td>
<td>Fish</td>
<td>0.0027</td>
<td>mg/L</td>
</tr>
<tr>
<td>Fluthiacet-methyl</td>
<td>21 d NOEC</td>
<td>Crustacea</td>
<td>0.035</td>
<td>mg/L</td>
</tr>
<tr>
<td>Fomesafen</td>
<td>96 h LC50</td>
<td>Fish</td>
<td>170</td>
<td>mg/L</td>
</tr>
<tr>
<td>Fomesafen</td>
<td>48 h EC50</td>
<td>Crustacea</td>
<td>330</td>
<td>mg/L</td>
</tr>
<tr>
<td>Fomesafen</td>
<td>72 h EC50</td>
<td>Algae</td>
<td>0.17</td>
<td>mg/L</td>
</tr>
<tr>
<td>Fomesafen</td>
<td>21 d NOEC</td>
<td>Crustacea</td>
<td>100</td>
<td>mg/L</td>
</tr>
</tbody>
</table>

### Persistence and degradability

### Bioaccumulation
Fomesafen, Fluthiacet-methyl: The substance does not have a potential for bioconcentration.

### Mobility
Fomesafen: Medium mobility; has some potential to reach groundwater. Fluthiacet-methyl: Slightly mobile. Not expected to reach groundwater.

### 13. DISPOSAL CONSIDERATIONS

#### Waste disposal methods
Improper disposal of excess pesticide, spray mixture, or rinsate is prohibited. If these wastes cannot be disposed of by use according to label instructions, contact appropriate disposal authorities for guidance.

#### Contaminated Packaging
Containers must be disposed of in accordance with local, state and federal regulations. Refer to the product label for container disposal instructions.

### 14. TRANSPORT INFORMATION

#### DOT
This material is not a hazardous material as defined by U.S. Department of Transportation at 49 CFR Parts 100 through 185.
15. REGULATORY INFORMATION

U.S. Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372:

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No</th>
<th>Weight %</th>
<th>SARA 313 - Threshold Values %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomesafen - 72178-02-0</td>
<td>72178-02-0</td>
<td>30.08</td>
<td>1.0</td>
</tr>
<tr>
<td>n-Butanol - 71-36-3</td>
<td>71-36-3</td>
<td>1-5</td>
<td>1.0</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazard Categories
- Acute health hazard: No
- Chronic health hazard: Yes
- Fire hazard: No
- Sudden release of pressure hazard: No
- Reactive Hazard: No

Clean Water Act
This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42):

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CWA - Reportable Quantities</th>
<th>CWA - Toxic Pollutants</th>
<th>CWA - Priority Pollutants</th>
<th>CWA - Hazardous Substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetic Acid</td>
<td>5000 lb</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>64-19-7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302):

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Hazardous Substances RQs</th>
<th>Extremely Hazardous Substances RQs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetic Acid</td>
<td>5000 lb</td>
<td></td>
</tr>
<tr>
<td>64-19-7</td>
<td>2270 kg</td>
<td></td>
</tr>
</tbody>
</table>
**Marvel™ Herbicide**

<table>
<thead>
<tr>
<th>n-Butanol</th>
<th>5000 lb</th>
<th>2270 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>71-36-3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**FIFRA Information**

This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and for workplace labels of non-pesticide chemicals. Following is the hazard information as required on the pesticide label:

**WARNING**

Causes substantial, but temporary eye injury.

MARVEL HERBICIDE is very toxic to algae and moderately toxic to fish

**US State Regulations**

**California Proposition 65**

This product does not contain any Proposition 65 chemicals.

**U.S. State Right-to-Know Regulations**

**International Inventories**

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>New Jersey</th>
<th>Massachusetts</th>
<th>Pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomesafen</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>72178-02-0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Propylene glycol</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>57-55-6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n-Butanol</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>71-36-3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Mexico - Grade**

Slight risk, Grade 1

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Carcinogen Status</th>
<th>Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td>n-Butanol</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mexico: Ceiling 50 ppm
Mexico: Ceiling 150 mg/m³

**WHMIS Hazard Class**

D2A - Very toxic materials

---

**16. OTHER INFORMATION**
Marvel™ Herbicide

SDS # : 7206-A
Revision date: 2016-05-26
Version 1.03

<table>
<thead>
<tr>
<th>NFPA</th>
<th>Health Hazards</th>
<th>Flammability</th>
<th>Instability</th>
<th>Special Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMIS</td>
<td>Health Hazards</td>
<td>Flammability</td>
<td>Physical hazard</td>
<td>Personal Protection</td>
</tr>
</tbody>
</table>

Revision date: 2016-05-26
Reason for revision: Initial Release

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Prepared By:
FMC Corporation

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End of Safety Data Sheet