1. PRODUCT AND COMPANY IDENTIFICATION

Product name
Certainty® Turf Herbicide

EPA Reg. No.
524-534

Product use
Herbicide

Chemical name
Not applicable.

Synonyms
None.

Company
MONSANTO COMPANY, 800 N. Lindbergh Blvd., St. Louis, MO, 63167

Telephone: 800-332-3111, Fax: 314-694-5557

E-mail: safety.datasheet@monsanto.com

Emergency numbers
FOR CHEMICAL EMERGENCY, SPILL LEAK, FIRE, EXPOSURE, OR ACCIDENT Call CHEMTREC - Day or Night: 1-800-424-9300 toll free in the continental U.S., Puerto Rico, Canada, or Virgin Islands. For calls originating elsewhere: 703-527-3887 (collect calls accepted).

FOR MEDICAL EMERGENCY - Day or Night: +1 (314) 694-4000 (collect calls accepted).

2. HAZARDS IDENTIFICATION

Emergency overview
Appearance and odour (colour/form/odour): Whitish / Granules, (free-flowing) / Odourless

CAUTION!
CAUSES MODERATE EYE IRRITATION

Potential health effects
Likely routes of exposure
eye contact, Skin contact, inhalation

Eye contact, short term
May cause temporary eye irritation.

Skin contact, short term
Not expected to produce significant adverse effects when recommended use instructions are followed.

Inhalation, short term
Not expected to produce significant adverse effects when recommended use instructions are followed.

Single ingestion
Not expected to produce significant adverse effects when recommended use instructions are followed.

Potential environmental effects
Not expected to produce significant adverse effects when recommended use instructions are followed.

Refer to section 11 for toxicological and section 12 for environmental information.

OSHA Status
This product is hazardous according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
3. COMPOSITION/INFORMATION ON INGREDIENTS

Active ingredient
N-[[{(4,6-dimethoxy-2-pyrimidinyl)amino]carbonyl]-2-(ethylsulfonyl)imidazo[1,2-a]pyridine-3-sulfonamide; {Sulfosulfuron}

Composition

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>CAS No.</th>
<th>% by weight (approximate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfosulfuron</td>
<td>141776-32-1</td>
<td>75</td>
</tr>
<tr>
<td>Other ingredients</td>
<td></td>
<td>25</td>
</tr>
</tbody>
</table>

The specific chemical identity is being withheld because it is trade secret information of Monsanto Company.

4. FIRST AID MEASURES

Use personal protection recommended in section 8.

Eye contact
If in eyes, hold eye open and rinse slowly and gently for 15-20 minutes. Remove contact lenses, if present, after first 5 minutes, then continue rinsing. 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.

Inhalation
If inhaled, move person to fresh air. If person is not breathing, call emergency number or ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. Call a poison control center or doctor for treatment advice.

Ingestion
Call 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 center or doctor. Do not give anything by mouth to an unconscious person.

5. FIRE-FIGHTING MEASURES

Flash point
Not applicable.

Extinguishing media
Recommended: Water, foam, dry chemical, carbon dioxide (CO2)

Unusual fire and explosion hazards
Minimise use of water to prevent environmental contamination. Environmental precautions: see section 6.

Hazardous products of combustion
Carbon monoxide (CO), carbon dioxide (CO2), sulphur oxides (SOx), nitrogen oxides (NOx), ammonia (NH3)

Fire fighting equipment
Self-contained breathing apparatus. Equipment should be thoroughly decontaminated after use.
6. ACCIDENTAL RELEASE MEASURES

Environmental precautions

SMALL QUANTITIES:
Low environmental hazard.

LARGE QUANTITIES:
Minimise spread.
Keep out of drains, sewers, ditches and water ways.

Methods for cleaning up

SMALL QUANTITIES:
Sweep, scoop or vacuum to remove.
Wash spill area with detergent and water.

LARGE QUANTITIES:
Dig up heavily contaminated soil.
Refer to section 7 for types of containers.
Collect in containers for disposal.
Flush residues with small quantities of water.
Minimise use of water to prevent environmental contamination.

Refer to section 13 for disposal of spilled material.
Use handling recommendations in Section 7 and personal protection recommendations in Section 8.

7. HANDLING AND STORAGE

Good industrial practice in housekeeping and personal hygiene should be followed.

Handling
Avoid contact with eyes, skin and clothing.
When using do not eat, drink or smoke.
Avoid breathing dust.
Wash hands thoroughly after handling or contact.
Wash contaminated clothing before re-use.
Thoroughly clean equipment after use.
Do not contaminate drains, sewers and water ways when disposing of equipment rinse water.
Refer to section 13 of the safety data sheet for disposal of rinse water.

Emptyed packages retain product residue and dust.

Storage
Maximum storage temperature: < 120 °F
Incompatible materials for storage: none known.
Keep out of reach of children.
Keep away from food, drink and animal feed.
Keep only in the original container.
Keep container tightly closed in a cool, well-ventilated place.
Keep container off wet floors.
Minimum shelf life: 2 years.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Airborne exposure limits

<table>
<thead>
<tr>
<th>Components</th>
<th>Exposure Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfosulfuron</td>
<td>No specific occupational exposure limit has been established.</td>
</tr>
<tr>
<td>Other ingredients</td>
<td>No specific occupational exposure limit has been established.</td>
</tr>
</tbody>
</table>
Engineering controls
No special requirement when used as recommended.

Eye protection
If there is significant potential for contact:
Wear dust goggles.

Skin protection
No special requirement when used as recommended.
Applicators and other handlers must wear:
Wear long sleeved shirt, long pants and shoes with socks.
Keep and wash personal protective equipment separately from other laundry.
If no such instructions for washables, use detergent and hot water.

Respiratory protection
No special requirement when used as recommended.

When recommended, consult manufacturer of personal protective equipment for the appropriate type of equipment for a given application.

9. PHYSICAL AND CHEMICAL PROPERTIES

These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

<table>
<thead>
<tr>
<th>Colour/colour range</th>
<th>Whitish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odour:</td>
<td>Odourless</td>
</tr>
<tr>
<td>Form:</td>
<td>Granules, (free-flowing)</td>
</tr>
</tbody>
</table>

Physical form changes (melting, boiling, etc.):

| Melting point:        | No data. |
| Boiling point:        | Not applicable. |
| Flash point:          | Not applicable. |
| Explosive properties: | No explosive properties |
| Auto ignition temperature: | Does not self-ignite. |
| Specific gravity:     | Not applicable. |
| Particle size:        | > 99.5 % Mesh size 40 |
| Vapour pressure:      | No significant volatility. |
| Vapour density:       | Not applicable. |
| Evaporation rate:     | No data. |
| Dynamic viscosity:    | Not applicable. |
| Kinematic viscosity:  | Not applicable. |
| Density:              | 33.8 lb/ft³; (loose bulk density) |
| Solubility:           | Water: Soluble |
| pH:                   | 5.5 @ 10 g/l |
| Partition coefficient:| log Pow: < 1 (sulfosulfuron) |

10. STABILITY AND REACTIVITY

Stability
Stable under normal conditions of handling and storage.

Oxidizing properties
Hazardous decomposition
   Thermal decomposition: Hazardous products of combustion: see section 5.

Self-accelerating decomposition temperature (SADT)
   No data.

Hazardous polymerization
   Does not occur.

11. TOXICOLOGICAL INFORMATION

This section is intended for use by toxicologists and other health professionals.

Data obtained on product, similar products and on components are summarized below.

Skin irritation
   Rabbit, 6 animals, Draize test:
      Days to heal: 0
      Primary Irritation Index (PII): 0.0/8.0
      FIFRA category IV.
      No skin irritation.

Eye irritation
   Rabbit, 6 animals, OECD 405 test:
      Days to heal: 3
      Slight irritation.
      FIFRA category III.

Similar formulation

Acute oral toxicity
   Rat, LD50: > 5,000 mg/kg body weight
      Practically non-toxic.
      FIFRA category IV.
      No mortality.

Acute dermal toxicity
   Rat, LD50: > 5,000 mg/kg body weight
      Practically non-toxic.
      FIFRA category IV.
      No mortality.

Acute inhalation toxicity
   Rat, LC50, 4 hours, dust: > 2.6 mg/L
      Practically non-toxic.
      FIFRA category IV.

Skin sensitization
   Guinea pig, maximisation test:
      Positive incidence: 0 %

Active ingredient

Mutagenicity
   In vitro and in vivo mutagenicity test(s):
      Not mutagenic.

Repeated dose toxicity
   Rat, oral, 90 days:
      NOAEL toxicity: 6,000 mg/kg diet
Other effects: weight loss

**Mouse, oral, 90 days:**
NOAEL toxicity: > 7,000 mg/kg diet
Other effects: none

**Chronic effects/carcinogenicity**

**Mouse, oral, 18 months:**
NOAEL toxicity: 700 mg/kg diet
Target organs/systems: urinary bladder
Other effects: histopathologic effects, blood biochemistry effects
NOEL tumour: 3,000 mg/kg diet
Tumours: urinary bladder
Tumours not relevant to man.

**Rat, oral, 22 months:**
NOAEL toxicity: 500 mg/kg diet
Target organs/systems: urethra, urinary bladder, kidneys
Other effects: organ weight change, histopathologic effects, increased mortality
NOEL tumour: 500 mg/kg diet
Tumours: urinary bladder, (carcinoma)
Tumours: urinary bladder, (papilloma)
Tumours not relevant to man.

**Toxicity to reproduction/fertility**

**Rat, oral, 2 generations:**
NOAEL toxicity: 5,000 mg/kg diet
NOAEL reproduction: 20,000 mg/kg diet
Target organs/systems in parents: kidneys
Other effects in parents: weight loss, decrease of body weight gain, organ weight change
Target organs/systems in pups: none
Other effects in pups: none

**Developmental toxicity/teratogenicity**

**Rat, oral, 6 - 15 days of gestation:**
NOAEL toxicity: 1,000 mg/kg body weight/day
NOAEL development: 1,000 mg/kg body weight/day
Target organs/systems in mother animal: none
Other effects in mother animal: none
Developmental effects: none

**Rabbit, oral, 7 - 18 days of gestation:**
NOAEL toxicity: 1,000 mg/kg body weight/day
NOAEL development: 1,000 mg/kg body weight/day
Target organs/systems in mother animal: none
Other effects in mother animal: none
Developmental effects: none

---

**12. ECOLOGICAL INFORMATION**

This section is intended for use by ecotoxicologists and other environmental specialists.

Data obtained on product, similar products and on components are summarized below.

**Arthropod toxicity**

**Honey bee (Apis mellifera):**
Oral/contact, 48 hours, LD50: > 26.5 µg/bee

**Aquatic toxicity, fish**

**Rainbow trout (Oncorhynchus mykiss):**
Acute toxicity (limit test), 96 hours, static, LC50: > 97 mg/L
No more than slightly toxic.

**Aquatic toxicity, invertebrates**

**Water flea (Daphnia magna):**
- Acute toxicity (limit test), 48 hours, static, EC50: > 101 mg/L
- Practically non-toxic.

**Similar formulation**

**Aquatic toxicity, algae/aquatic plants**

**Green algae (Selenastrum capricornutum):**
- Acute toxicity, 72 hours, static, EC50: 0.12 mg/L
- Highly toxic.

**Active ingredient**

**Avian toxicity**

**Bobwhite quail (Colinus virginianus):**
- Dietary toxicity, 5 days, LC50: > 5,620 mg/kg diet
- Practically non-toxic.

**Mallard duck (Anas platyrhynchos):**
- Dietary toxicity, 5 days, LC50: > 5,620 mg/kg diet
- Practically non-toxic.

**Bobwhite quail (Colinus virginianus):**
- Acute oral toxicity, single dose, LD50: > 2,250 mg/kg body weight
- Practically non-toxic.

**Mallard duck (Anas platyrhynchos):**
- Acute oral toxicity, single dose, LD50: > 2,250 mg/kg body weight
- Practically non-toxic.

**Soil organism toxicity, invertebrates**

**Earthworm (Eisenia foetida):**
- Acute toxicity (limit test), 14 days, LC50: > 848 mg/kg dry soil

**Bioaccumulation**

No significant bioaccumulation is expected.

**Dissipation**

**Soil, field:**
- Half life: 11 - 47 days

**Water, aerobic:**
- Half life: 16 - 20 days

13. **DISPOSAL CONSIDERATIONS**

**Product**
- Keep out of drains, sewers, ditches and water ways.
- Recycle if appropriate facilities/equipment available.
- Burn in proper incinerator.
- Follow all local/regional/national/international regulations.

**Container**
- See the individual container label for disposal information.
- Emptied packages retain product residue and dust.
- Observe all labelled safeguards until container is cleaned, reconditioned or destroyed.
- Empty packaging completely.
- Store for collection by approved waste disposal service.
- Ensure packaging cannot be reused.
- Do NOT re-use containers.
- Recycle if appropriate facilities/equipment available.
- Follow all local/regional/national/international regulations.
Use handling recommendations in Section 7 and personal protection recommendations in Section 8.

14. TRANSPORT INFORMATION

The data provided in this section is for information only. Please apply the appropriate regulations to properly classify your shipment for transportation.

Not regulated in non-bulk packages.

Special provisions
This material meets the definition of a marine pollutant.

IMDG Code
Use description for ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S., LIMITED QUANTITY

IATA/ICAO
Use description for ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.

15. REGULATORY INFORMATION

TSCA Inventory
Exempt

OSHA Hazardous Components
Surfactant(s)

SARA Title III Rules
Section 311/312 Hazard Categories
Immediate
Section 302 Extremely Hazardous Substances
Not applicable.
Section 313 Toxic Chemical(s)
Not applicable.

CERCLA Reportable quantity
Not applicable.

16. OTHER INFORMATION

The information given here is not necessarily exhaustive but is representative of relevant, reliable data. Follow all local/regional/national/international regulations. Please consult supplier if further information is needed. In this document the British spelling was applied. Significant changes versus previous edition. This Safety Data Sheet has been prepared following the Regulation (EC) No. 1907/2006 as last amended by Regulation (EC) No. 453/2010

<table>
<thead>
<tr>
<th>NFPA</th>
<th>Health</th>
<th>Flammability</th>
<th>Instability</th>
<th>Additional Markings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

0 = Minimal hazard, 1 = Slight hazard, 2 = Moderate hazard, 3 = Severe hazard, 4 = Extreme hazard

Full denomination of most frequently used acronyms: BCF (Bioconcentration Factor), BOD (Biochemical Oxygen Demand), COD (Chemical Oxygen Demand), EC50 (50% effect concentration), ED50 (50% effect dose), I.M. (intramuscular), I.P. (intraperitoneal), I.V. (intravenous), Koc (Soil adsorption coefficient), LC50 (50% lethality concentration), LD50 (50% lethality dose), LDLo (Lower limit of lethal dosage), LEL (Lower...
This Material Safety Data Sheet (MSDS) serves different purposes than and DOES NOT REPLACE OR MODIFY THE EPA-APPROVED PRODUCT LABELING (attached to and accompanying the product container). This MSDS 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, while the labeling provides that information specifically for product use in the ordinary course. Use, storage and disposal of pesticide products are regulated by the EPA under the authority of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) through the product labeling, and all necessary and appropriate precautionary, use, storage, and disposal information is set forth on that labeling. It is a violation of federal law to use a pesticide product in any manner not prescribed on the EPA-approved label.

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