1. PRODUCT AND COMPANY IDENTIFICATION

Product name
Roundup® Weed & Grass Killer Concentrate Plus

EPA Reg. No.
71995-29

Chemical name
Not applicable.

Synonyms
None.

Company
Monsanto Company, Lawn & Garden Products, P.O. Box 418, Marysville, OH, 43041
Telephone: 1-800-246-7219
E-mail: TS-SAFETYDATASHEET@DOMINO.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: 1-800-246-7219

2. HAZARDS IDENTIFICATION

Emergency overview
Appearance and odour (colour/form/odour): Amber / Liquid / Musky

CAUTION!
CAUSES MODERATE EYE IRRITATION

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

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
Isopropylamine salt of N-(phosphonomethyl)glycine; {Isopropylamine salt of glyphosate}
6,7-Dihydodipyrido(1,2-a:2',1'c) pyrazinium dibromide; {Diquat dibromide}
### Composition

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>CAS No.</th>
<th>% by weight (approximate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isopropylamine salt of glyphosate</td>
<td>38641-94-0</td>
<td>18</td>
</tr>
<tr>
<td>Diquat dibromide</td>
<td>85-00-7</td>
<td>0.73</td>
</tr>
<tr>
<td>Water and minor formulating ingredients</td>
<td></td>
<td>81.27</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.

**Skin contact**
- Wash affected skin with plenty of water.
- Take off contaminated clothing, wristwatch, jewellery.
- Wash clothes and clean shoes before re-use.

**Inhalation**
- Remove to fresh air.

**Advice to doctors**
- This product is not an inhibitor of cholinesterase.

**Antidote**
- Treatment with atropine and oximes is not indicated.

### 5. FIRE-FIGHTING MEASURES

**Flash point**
- Does not flash.

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

**Unusual fire and explosion hazards**
- None.
- Environmental precautions: see section 6.

**Hazardous products of combustion**
- Carbon monoxide (CO), nitrogen oxides (NOx), phosphorus oxides (PxOy), hydrogen bromide (HBr)

**Fire fighting equipment**
- Self-contained breathing apparatus.
- Equipment should be thoroughly decontaminated after use.

### 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**
- Use personal protection recommended in section 8.

**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:
Flush spill area with water.
LARGE QUANTITIES:
Absorb in earth, sand or absorbent material.
Dig up heavily contaminated soil.
Collect in containers for disposal.
Refer to section 7 for types of containers.
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.
When using do not eat, drink or smoke.
Wash hands thoroughly after handling or contact.
Do not contaminate drains, sewers and water ways when disposing of equipment rinse water.
Emptied packages retain product residue and dust.
Observe all labelled safeguards until container is cleaned, reconditioned or destroyed.

Storage
Compatible materials for storage: stainless steel, aluminium, fibreglass, plastic, glass lining
Incompatible materials for storage: galvanised steel, unlined mild steel, see section 10.
Keep out of reach of children.
Keep away from food, drink and animal feed.
Keep only in the original container.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Airborne exposure limits

<table>
<thead>
<tr>
<th>Components</th>
<th>Exposure Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isopropylamine salt of glyphosate</td>
<td>No specific occupational exposure limit has been established.</td>
</tr>
<tr>
<td>Diquat dibromide</td>
<td>TLV (ACGIH): 0.5 mg/m3: inhalable fraction, skin, No specific occupational exposure limit has been established., The exposure limit indicated is for the diquat cation. TLV (ACGIH): 0.1 mg/m3: respirable fraction, skin, No specific occupational exposure limit has been established., The exposure limit indicated is for the diquat cation. PEL (OSHA): No specific occupational exposure limit has been established.</td>
</tr>
<tr>
<td>Water and minor formulating ingredients</td>
<td>No specific occupational exposure limit has been established.</td>
</tr>
</tbody>
</table>
Provide adequate ventilation to keep airborne concentration below exposure limits.

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

**Skin protection**
No special requirement when used as recommended.
If repeated or prolonged contact:
Wear chemical resistant gloves.

**Respiratory protection**
If airborne exposure is excessive:
Wear respirator.
Full facepiece/hood/helmet respirator replaces need for chemical goggles.

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>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour/colour range</td>
<td>Amber</td>
</tr>
<tr>
<td>Odour</td>
<td>Musky</td>
</tr>
<tr>
<td>Form</td>
<td>Liquid</td>
</tr>
<tr>
<td>Melting point</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Boiling point</td>
<td>No data.</td>
</tr>
<tr>
<td>Flash point</td>
<td>Does not flash.</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>No data.</td>
</tr>
<tr>
<td>Auto ignition temperature</td>
<td>No data.</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>1.073 @ 20 °C / 15.6 °C</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>No significant volatility; aqueous solution.</td>
</tr>
<tr>
<td>Vapour density</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>No data.</td>
</tr>
<tr>
<td>Dynamic viscosity</td>
<td>No data.</td>
</tr>
<tr>
<td>Kinematic viscosity</td>
<td>No data.</td>
</tr>
<tr>
<td>Density</td>
<td>Not available.</td>
</tr>
<tr>
<td>Solubility</td>
<td>Water: Soluble</td>
</tr>
<tr>
<td>pH</td>
<td>4.6</td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>log Pow: &lt; -3.2 @ 25 °C (glyphosate)</td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>log Pow: -4.60 @ 20 °C (diquat dibromide)</td>
</tr>
</tbody>
</table>

### 10. STABILITY AND REACTIVITY

**Stability**
Stable under normal conditions of handling and storage.

**Oxidizing properties**
No data.
Materials to avoid/Reactivity
Reacts with galvanised steel or unlined mild steel to produce hydrogen, a highly flammable gas that could explode.

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

Self-accelerating decomposition temperature (SADT)
No data.

11. TOXICOLOGICAL INFORMATION

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

Monsanto has not conducted toxicity studies on this product. Data obtained on similar products and on components are summarized below.

Similar formulation

Acute oral toxicity
Rat, LD50: > 5,000 mg/kg body weight
Practically non-toxic.
FIFRA category IV.

Acute dermal toxicity
Rat, LD50: > 5,000 mg/kg body weight
Practically non-toxic.
FIFRA category IV.

Skin irritation
Rabbit, 3 animals, OECD 404 test:
Days to heal: 2
Primary Irritation Index (PII): 0.4/8.0
Essentially non irritating.
FIFRA category IV.

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

Acute inhalation toxicity
Rat, LC50, 4 hours, aerosol:
Practically non-toxic.
FIFRA category IV.
No 4-hr LC50 at the maximum tested concentration.

Skin sensitization
Guinea pig, 3-induction Buehler test:
Positive incidence: 0 %
Negative.

N-(phosphonomethyl)glycine: [glyphosate]

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

Repeated dose toxicity
Rabbit, dermal, 21 days:
NOAEL toxicity: > 5,000 mg/kg body weight/day
Target organs/systems: none
Other effects: none

Rat, oral, 3 months:
NOAEL toxicity: > 20,000 mg/kg diet
Target organs/systems: none
Other effects: none

Chronic effects/carcinogenicity

Mouse, oral, 24 months:
NOAEL toxicity: ~ 5,000 mg/kg diet
Target organs/systems: liver
Other effects: decrease of body weight gain, histopathologic effects
NOEL tumour: > 30,000 mg/kg diet
Tumours: none

Rat, oral, 24 months:
NOAEL toxicity: ~ 8,000 mg/kg diet
Target organs/systems: eyes
Other effects: decrease of body weight gain, histopathologic effects
NOEL tumour: > 20,000 mg/kg diet
Tumours: none

Toxicity to reproduction/fertility

Rat, oral, 2 generations:
NOAEL toxicity: 10,000 mg/kg diet
NOAEL reproduction: > 30,000 mg/kg diet
Target organs/systems in parents: none
Other effects in parents: decrease of body weight gain
Target organs/systems in pups: none
Other effects in pups: decrease of body weight gain
Effects on offspring only observed with maternal toxicity.

Developmental toxicity/teratogenicity

Rat, oral, 6 - 19 days of gestation:
NOAEL toxicity: 1,000 mg/kg body weight
NOAEL development: 1,000 mg/kg body weight
Other effects in mother animal: decrease of body weight gain, decrease of survival
Developmental effects: weight loss, post-implantation loss, delayed ossification
Effects on offspring only observed with maternal toxicity.

Rabbit, oral, 6 - 27 days of gestation:
NOAEL toxicity: 175 mg/kg body weight
NOAEL development: 175 mg/kg body weight
Target organs/systems in mother animal: none
Other effects in mother animal: decrease of survival
Developmental effects: none

Diquat dibromide

Mutagenicity

In vitro and in vivo mutagenicity test(s):
Equivocal response.

Repeated dose toxicity

Rat, inhalation, 3 weeks:
NOEL toxicity: 0.1 mg/m3
Target organs/systems: lung
Other effects: organ weight change, histopathologic effects, local irritation

Chronic effects/carcinogenicity

Dog, oral, 52 weeks:
NOAEL toxicity: 0.5 mg/kg body weight/day
Target organs/systems: eyes, adrenals
Other effects: organ weight change

Rat, oral, 2 years:
NOAEL toxicity: 0.58 mg/kg body weight/day
Target organs/systems: eyes
NOEL tumour: 2.91 mg/kg body weight/day
Tumours: bone marrow, (sarcoma)
Tumours not related to treatment.

Mouse, oral, 2 years:
NOAEL toxicity: 3.56 mg/kg body weight/day
Target organs/systems: kidneys
Other effects: decrease of body weight gain, organ weight change
NOEL tumour: > 37.8 mg/kg body weight/day
Tumours: none

**Toxicity to reproduction/fertility**

**Rat, oral, 2 generations:**
NOEL toxicity: 0.8 mg/kg body weight/day
NOEL reproduction: 4 mg/kg body weight/day
Target organs/systems in parents: eyes
Other effects in parents: decrease of body weight gain, decrease of food consumption
Other effects in pups: decrease of body weight gain, decrease of litter survival
Effects on offspring only observed with maternal toxicity.

**Developmental toxicity/teratogenicity**

**Rat, oral, 7 - 16 days of gestation:**
NOEL toxicity: < 4 mg/kg body weight/day
NOEL development: 12 mg/kg body weight/day
Other effects in mother animal: decrease of body weight gain, decrease of food consumption
Developmental effects: weight loss, skeletal variations, visceral malformations, delayed ossification
Effects on offspring only observed with maternal toxicity.

**Rabbit, oral, 7 - 19 days of gestation:**
NOEL toxicity: 1 mg/kg body weight/day
NOEL development: 3 mg/kg body weight/day
Other effects in mother animal: decrease of body weight gain, decrease of food consumption
Developmental effects: visceral variations, delayed ossification
Effects on offspring only observed with maternal toxicity.

**Mouse, oral, 6 - 15 days of gestation:**
NOEL toxicity: 1 mg/kg body weight/day
NOEL development: 2 mg/kg body weight/day
Other effects in mother animal: decrease of body weight gain, breathing irregularities, neurotoxic signs, decrease of survival
Developmental effects: weight loss, skeletal variations
Effects on offspring only observed with maternal toxicity.

**Acute neurotoxicity**

**Rat, oral, single dose, gavage:**
NOEL: 25 mg/kg body weight
Other effects: neuromuscular effects
Not neurotoxic.

**Repeated dose neurotoxicity**

**Rat, oral, 14 weeks, dietary:**
NOAEL: 8 mg/kg body weight/day
Target organs/systems: eyes
Other effects: decrease of body weight gain
Not neurotoxic.

---

12. **ECOLOGICAL INFORMATION**

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

Data obtained on a more concentrated glyphosate formulation and/or glyphosate are summarized below. The minor active ingredient is not predicted to significantly contribute to the ecological toxicity of this formulation.
Similar glyphosate formulation

Aquatic toxicity, fish
Rainbow trout (Oncorhynchus mykiss):
  Acute toxicity, 96 hours, static, LC50: 5.4 mg/L
  Moderately toxic.
Bluegill sunfish (Lepomis macrochirus):
  Acute toxicity, 96 hours, static, LC50: 7.3 mg/L
  Moderately toxic.

Aquatic toxicity, invertebrates
Water flea (Daphnia magna):
  Acute toxicity, 48 hours, static, EC50: 11 mg/L
  Slightly toxic.

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

Arthropod toxicity
Honey bee (Apis mellifera):
  Oral/contact, 48 hours, LD50: > 100 µg/bee
  Practically non-toxic.

Soil organism toxicity, invertebrates
Earthworm (Eisenia fetida):
  Acute toxicity, 14 days, LC50: > 1,250 mg/kg soil
  Practically non-toxic.

Isopropylamine salt of glyphosate (62%)

Aquatic toxicity, algae/aquatic plants
Green algae (Scenedesmus subspicatus):
  Acute toxicity, 72 hours, static, Eb50 (biomass): 72.9 mg/L
  Slightly toxic.

\( \text{N-(phosphonomethyl)glycine (glyphosate)} \)

Bioaccumulation
Bluegill sunfish (Lepomis macrochirus):
  Whole fish: BCF: < 1
  No significant bioaccumulation is expected.

Dissipation
Soil, field:
  Half life: 2 - 174 days
  Koc: 884 - 60,000 L/kg
  Adsorbs strongly to soil.
Water, aerobic:
  Half life: < 7 days

13. DISPOSAL CONSIDERATIONS

Product
  Keep out of drains, sewers, ditches and water ways.
  Recycle if appropriate facilities/equipment available.
Dispose of as hazardous industrial waste.
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.
Triple or pressure rinse empty containers.
Do NOT contaminate water when disposing of rinse waters.
Ensure packaging cannot be reused.
Do NOT re-use containers.
Store for collection by approved waste disposal service.
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 hazardous under the applicable DOT, ICAO/IATA, IMO, TDG and Mexican regulations.

### 15. REGULATORY INFORMATION

**TSCA Inventory**
Exempt

**OSHA Hazardous Components**
Diquat dibromide
Surfactant

**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.
This Safety Data Sheet has been prepared following the EU Directive 91/155/EEC as last amended by EU Directive 2001/58/EC and according to EU Regulation 1907/2006.
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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