1. PRODUCT AND COMPANY IDENTIFICATION

Product name
Roundup Original® Herbicide

EPA Reg. No.
524-445

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

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. COMPOSITION/INFORMATION ON INGREDIENTS

Active ingredient
Isopropylamine salt of N-(phosphonomethyl)glycine; {Isopropylamine salt of glyphosate}

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>41</td>
</tr>
<tr>
<td>Other ingredients</td>
<td></td>
<td>59</td>
</tr>
</tbody>
</table>

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

OSHA Status
This product is hazardous according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

3. HAZARDS IDENTIFICATION

Emergency overview
Appearance and odour (colour/form/odour): Yellow - Amber / Liquid / Slight

WARNING!
CAUSES SUBSTANTIAL BUT TEMPORARY EYE INJURY
HARMFUL IF SWALLOWED
HARMFUL IF INHALED

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

4. FIRST AID MEASURES

Eye contact
Immediately flush with plenty of water.
Continue for at least 15 minutes.
If easy to do, remove contact lenses.
If there are persistent symptoms, obtain medical advice.

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

Inhalation
Remove to fresh air.

Ingestion
Immediately offer water to drink.
Do NOT induce vomiting unless directed by medical personnel.
If symptoms occur, get medical attention.

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, carbon dioxide (CO2), foam

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

Hazardous products of combustion
Carbon monoxide (CO), nitrogen oxides (NOx), phosphorus oxides (PxOy)

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.

7. HANDLING AND STORAGE

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

Handling
Avoid contact with skin and eyes.
When using do not eat, drink or smoke.
Wash hands thoroughly after handling or contact.
Thoroughly clean equipment after use.
Emptied containers retain vapour and product residue.
Observe all labelled safeguards until container is cleaned, reconditioned or destroyed.

Storage
Minimum storage temperature: 10 °F
Compatible materials for storage: stainless steel, aluminium, plastic, fibreglass, glass lining
Incompatible materials for storage: galvanized 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.
Partial crystallization may occur on prolonged storage below the minimum storage temperature.
If frozen, place in warm room and shake frequently to put back into solution.
Minimum shelf life: 5 years.

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>Other ingredients</td>
<td>No specific occupational exposure limit has been established.</td>
</tr>
</tbody>
</table>
Engineering controls
Have eye wash facilities immediately available at locations where eye contact can occur.

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

Skin protection
If repeated or prolonged contact:
Wear chemical resistant gloves.

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>Yellow - Amber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form:</td>
<td>Liquid</td>
</tr>
<tr>
<td>Odour:</td>
<td>Slight</td>
</tr>
<tr>
<td>Flash point:</td>
<td>Does not flash.</td>
</tr>
<tr>
<td>Specific gravity:</td>
<td>1.1655 @ 20 °C / 15.6 °C</td>
</tr>
<tr>
<td>Vapour pressure:</td>
<td>22 mmHg 22 °C</td>
</tr>
<tr>
<td>pH:</td>
<td>4.4 - 5.0</td>
</tr>
<tr>
<td>Partition coefficient (log Pow):</td>
<td>&lt; 0.000 (active ingredient)</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

Stability
Stable under normal conditions of handling and storage.

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

Materials to avoid/Reactivity
Reacts with galvanized steel or unlined mild steel to produce hydrogen, a highly flammable gas that could explode.

Hazardous polymerization
Does not occur.

11. TOXICOLOGICAL INFORMATION

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

Data obtained on product and components are summarized below.

Acute oral toxicity
Rat, LD50 (limit test): > 5,000 mg/kg body weight
Other effects: breathing difficulty, decreased activity, soft stools
Practically non-toxic.
**Roundup Original® Herbicide**

**Version:** 1.3  **Effective date:** 10/18/2006

**MONSANTO COMPANY**

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**FIFRA category IV.**

**No mortality.**

**Acute dermal toxicity**

**Rat, LD50 (limit test):** > 5,000 mg/kg body weight

- Target organs/systems: none
- Other effects: none
- Practically non-toxic.
- FIFRA category IV.
- No mortality.

**Acute inhalation toxicity**

**Rat, LC50, 4 hours, aerosol:** 2.6 mg/L

- Target organs/systems: none
- Other effects: breathing difficulty, decreased activity, local effects
- Practically non-toxic.
- FIFRA category IV.

**Skin irritation**

**Rabbit, 6 animals, OECD 404 test:**

- Days to heal: 1
- Primary Irritation Index (PII): 0.4/8.0
- Other effects: none
- Essentially non irritating.
- FIFRA category IV.

**Eye irritation**

**Rabbit, 6 animals, OECD 405 test:**

- Days to heal: 10
- Moderate irritation.
- FIFRA category II.

**Skin sensitization**

**Guinea pig, Buehler test:**

- Positive incidence: 0 %

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**EXPERIENCE WITH HUMAN EXPOSURE**

**Ingestion, short term, case report(s):**

- **Gastro-intestinal effects:** irritation, nausea/vomiting, diarrhoea

**Ingestion, short term:**

- **Respiratory effects:** increased fluid in lungs (lung/pulmonary oedema)
- **Cardiovascular effects:** decreased blood pressure (hypotension)

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**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:**

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

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

**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

12. **ECOLOGICAL INFORMATION**

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

Data obtained on similar products are summarized below.

**Similar formulation**

**Aquatic toxicity, fish**
- Bluegill sunfish (Lepomis macrochirus):
  - Acute toxicity, 96 hours, flowthrough, LC50: 5.8 mg/L
  - Moderately toxic.
- Rainbow trout (Oncorhynchus mykiss):
  - Acute toxicity, 96 hours, flowthrough, LC50: 8.2 mg/L
  - Moderately toxic.

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

**Aquatic toxicity, algae/aquatic plants**
- Green algae (Selenastrum capricornutum):
  - Acute toxicity, 96 hours, static, EC50: 2.6 mg/L
  - Moderately toxic.
- Duckweed (Lemna minor):
  - Acute toxicity, 7 days, static, EC50 (frond number): 6 mg/L
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.

Arthropod toxicity
Honey bee (Apis mellifera):
  Oral/contact, 48 hours, LD50: > 326 µg/bee
  Practically non-toxic.

Soil organism toxicity, invertebrates
Earthworm (Eisenia fetida):
  Acute toxicity, 14 days, LC50: > 5,000 mg/kg dry soil
  Practically non-toxic.

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
Dispose of as hazardous industrial waste.
Recycle if appropriate facilities/equipment available.
Burn in special, controlled high temperature incinerator.
Keep out of drains, sewers, ditches and water ways.
Follow all local/regional/national/international regulations.

Container
Triple or pressure rinse empty containers.
Pour rinse water into spray tank.
Store for collection by approved waste disposal service.
Dispose of as hazardous industrial waste.
Do NOT re-use containers.
Follow all local/regional/national/international regulations.

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
All components are on the US EPA's TSCA Inventory

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.
For more information refer to product label.
Please consult Monsanto if further information is needed.
In this document the British spelling was applied.
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Health Flammability Instability Additional Markings
NFPA 2 1 1

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 Explosion Limit), LOAEC (Lowest Observed Adverse Effect Concentration), LOAEL (Lowest Observed Adverse Effect Level), LOEC (Lowest Observed Effect Concentration), LOEL (Lowest Observed Effect Level), MEL (Maximum Exposure limit), MTD (Maximum Tolerated Dose), NOAEC (No Observed Adverse Effect Concentration), NOAEL (No Observed Adverse Effect Level), NOEC (No Observed Effect Concentration), NOEL (No Observed Effect Level), OEL (Occupational Exposure Limit), PEL (Permissible Exposure Limit), PI (Primary Irritation Index), Pow (Partition coefficient n-octanol/water), S.C. (subcutaneous), STEL (Short-Term Exposure Limit), TLV-C (Threshold Limit Value - Ceiling), TLV-TWA (Threshold Limit Value - Time Weighted Average), UEL (Upper Explosion Limit)

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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