

Monsanto MATERIAL SAFETY DATA

MONSANTO PRODUCT NAME

ROUNDUP® HERBICIDE

MONSANTO COMPANY
800 N. LINDBERGH BLVD.
ST. LOUIS, MO 63167

Emergency Phone No.
(Call Collect)
314-694-4000

PRODUCT IDENTIFICATION

Synonyms:	None.	
Chemical Name:	Not Applicable, Formulated Product	
Active Ingredient:	*Isopropylamine salt of glyphosate.....	41.0%
Inert Ingredients:	59.0%
		100.0%

*Contains 480 grams per liter or 4 pounds of the active ingredient Isopropylamine salt of N-(phosphonomethyl) glycine per U.S. gallon. Equivalent to 356 grams per liter or 3 pounds per U.S. gallon of the acid, glyphosate.

CAS Reg. No.: Not Applicable, Formulated Product

CAS Reg. No. Active Ingredient: 38641-94-0

EPA Reg. No.: 524-308

DOT Proper Shipping Name: Not Applicable

DOT Hazard Class/ I.D. No.: Not Applicable

DOT Label: Not Applicable

Reportable Quantity (RQ) Under Clean Water Act: Not Applicable

U.S. Surface Freight Classification: Weed Killing Compound, N.O.I.B.N.

The substance listed below is identified as a hazardous chemical under the criteria of the OSHA Hazard Communication Standard (29 CFR 1910.1200):

Surfactant, about 15%. The specific chemical identity is withheld because it is trade secret information of Monsanto Company.

WARNING STATEMENTS

Keep out of reach of children.
WARNING!
CAUSES EYE IRRITATION
HARMFUL IF SWALLOWED

MATERIAL SAFETY DATA

Roundup - herbicide

PRECAUTIONARY MEASURES

Do not get in eyes, on skin or on clothing.

Wash thoroughly after handling.

Avoid direct applications to any body of water. Do not contaminate water by disposal of waste or cleaning of equipment.

EMERGENCY AND FIRST AID PROCEDURES

FIRST AID: IF IN EYES, immediately flush with plenty of water for at least 15 minutes. Call a physician.

IF ON SKIN, immediately flush with plenty of water. Remove contaminated clothing. Wash clothing before reuse.

IF SWALLOWED, this product will cause gastrointestinal tract irritation. Immediately dilute by swallowing water or milk. Call a physician.

OCCUPATIONAL CONTROL PROCEDURES

Eye Protection: Wear chemical splash goggles during mixing/pouring operations or other activities in which eye contact with undiluted Roundup® herbicide is likely to occur.

Skin Protection: In cases in which prolonged or repeated skin contact with Roundup herbicide may occur, long-sleeved shirt, long pants, and chemical protective (e.g. rubber) gloves are recommended. Wash hands and contaminated skin after handling. Clothing soaked with Roundup solution should be promptly removed and laundered before reuse.

Respiratory Protection: Respiratory protection should not be required for normal use and handling. During periods of abnormal exposure to heavy spray or mist, use of NIOSH/MSHA approved equipment for pesticide vapor/mist is recommended. The respirator use limitations specified by NIOSH/MSHA or the manufacturer must be observed.

Ventilation: No special precautions are recommended.

Airborne Exposure Limits: Product: Roundup Herbicide - 100% by wt.

OSHA PEL: None established

ACGIH TLV: None established

Surfactant ingredient: Approx. 15% by wt.

OSHA PEL: None established

ACGIH TLV: None established

FIRE PROTECTION INFORMATION

Flash Point: >200°F. **Method:** Tag Closed Cup

Extinguishing Media: Water spray, foam, dry chemical or CO₂ or any Class B extinguishing agent.

Special Firefighting Procedures: Firefighters and others who may be exposed to vapors or products of combustion should wear a self-contained breathing apparatus and full protective clothing. Equipment should be thoroughly cleaned after use.

Unusual Fire and Explosion Hazards: None.

Monsanto MATERIAL SAFETY DATA

REACTIVITY DATA

Stability: Stable for at least 5 years under normal conditions of warehouse storage. Heated facilities are not required.

Incompatibility: This product and spray solutions of this product should be mixed, stored and applied only in stainless steel, aluminum, fiberglass, plastic and plastic lined containers.

DO NOT MIX, STORE OR APPLY THIS PRODUCT OR SPRAY SOLUTIONS OF THIS PRODUCT IN GALVANIZED OR UNLINED STEEL (EXCEPT STAINLESS STEEL) CONTAINERS OR SPRAY TANKS. This product or spray solutions of this product react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture. This gas mixture could flash or explode, causing serious personal injury, if ignited by open flame, spark, welder's torch, lighted cigarette or other ignition source.

Hazardous Decomposition Products: None.

Hazardous Polymerization: Does not occur. This product can react with caustic (basic) materials to liberate heat. This is not a polymerization but rather a chemical neutralization in an acid-base reaction.

HEALTH EFFECTS SUMMARY

The following information presents both human experience and the results of scientific experiments used by qualified experts to assess the effects of Roundup herbicide on the health of exposed individuals and to support the Precautionary Statements and Occupational Control Procedures recommended in this document. To avoid misunderstanding, the data provided in this section should be interpreted by individuals trained in evaluation of this type of information.

Human Experience

Dermal contact and inhalation are expected to be the primary routes of occupational exposure to Roundup herbicide. Direct contact with this material may cause temporary eye irritation and conjunctivitis. Prolonged contact with Roundup herbicide may cause dermal irritation. Ingestion of Roundup herbicide has been reported to produce gastrointestinal discomfort, nausea, vomiting and diarrhea.

Toxicological Data

Data from Monsanto studies indicate the following:

- Oral LD₅₀ (Rat): 5,400 mg/kg, Practically Nontoxic
- Dermal LD₅₀ (Rabbit): >5,000 mg/kg, Practically Nontoxic
- Eye Irritation (Rabbit, 24-hr): (FHSA) Score = 4.1 on a scale of 110.0, Slightly Irritating
- Skin Irritation (Rabbit, 24-hr): (FHSA) Score = 4.3 on a scale of 8.0, Moderately Irritating
- DOT Skin Irritation (Rabbit, 4-hr): Not Corrosive
- Inhalation LC₅₀ (Rat, 4-hr): 3.18 mg/l (analytical concentration), Slightly Toxic

Patch testing of 50 human volunteers with Roundup herbicide at use concentration and 5X use concentration produced no positive reactions following initial application, any of 15 repeated applications in the induction phase, or on subsequent challenge 2 weeks later. Roundup herbicide is not considered a primary irritant or a sensitizing agent.

Patch testing of guinea pigs with Roundup herbicide produced essentially no irritation following initial application; mild to moderate erythema (redness), edema (swelling) and/or mild necrosis (tissue damage) were observed in some animals during subsequent repeated exposures in the induction phase. On challenge, no dermal response was observed in any of the animals. Roundup herbicide is not considered a dermal sensitizing agent in guinea pigs.

(Health Effects Summary Continued On Next Page)

MATERIAL SAFETY DATA
Roundup - herbicide

HEALTH EFFECTS SUMMARY (Continued)

Single male and female dogs were orally administered Roundup herbicide or a 2 percent aqueous solution of Roundup herbicide at dosages ranging from 0.3125 to 5.0 ml/kg. No mortality and no inhibition of plasma acetylcholinesterase activity were reported. The most common effects observed were vomiting and diarrhea, which occurred shortly after dosing.

A series of 21-day dermal toxicity studies have been conducted in which Roundup herbicide was applied to the skin of male rabbits 6 hours per day, 5 days per week at various concentrations. At 5 times the intended use concentration, severe dermal irritation and systemic toxicity (mortality, reduced food consumption, body weight loss, and testicular effects) were observed. Rabbits treated with 3 times the intended use concentration and below, or only with the active ingredient glyphosate, exhibited only slight to moderate local irritation and had no signs of systemic effects. When the surfactant in Roundup formulation was tested, marked irritation and systemic effects were observed which were similar to those seen with the higher concentration of Roundup. Effects observed in these studies are considered to be a secondary response to the stress of severe dermal irritation, to which rabbits are particularly sensitive, rather than the result of direct systemic toxicity.

Rats were exposed by inhalation to aerosol concentrations of 0.05, 0.16 and 0.36 mg of a 33.3% Roundup solution per liter air 6 hours/day, 5 days/week for a total of 22 exposures over a 4 week period. Minor nasal irritation was observed in female animals. No adverse hematologic, biochemical or systemic histopathologic effects were noted. The systemic no-effect level was considered to be 0.36 mg of a 33.3% Roundup solution per liter of air.

Following a 24-hr topical application of Roundup herbicide to the abdomen of rhesus monkeys, approximately 1.8 percent of the administered dose of the active ingredient (glyphosate) was systemically absorbed. Excretion in the urine was the major route of elimination following systemic absorption.

Components

Data from Monsanto studies and from the scientific literature on the components of Roundup herbicide is discussed below:

Isopropylamine Salt of Glyphosate (MON 0139)

The isopropylamine salt of glyphosate (MON 0139) has been tested in acute and subchronic toxicity studies. For additional toxicity information on this material, please refer to the MON 0139 Material Safety Data Sheet.

Surfactant

The surfactant properties of this material are considered to contribute to the eye and skin irritation potential of Roundup herbicide.

PHYSICAL DATA

Appearance:	Clear, viscous amber-colored solution.
Odor:	Practically odorless to slight amine-like odor.
pH:	4.4 - 4.9
Specific Gravity (Water = 1):	1.17

MATERIAL SAFETY DATA Roundup[®] Herbicide

Monsanto MATERIAL SAFETY DATA

SPILL, LEAK & DISPOSAL INFORMATION

Page 5 of 6

Spill/Leak:

Observe all protective and safety precautions including use of rubber boots or rubber overshoes when cleaning up spills — See Occupational Control Procedures.

Liquid spills on floor or other impervious surfaces should be contained or diked, and should be absorbed with attapulgite, bentonite or other absorbent clays (kitty litter, etc.) Collect contaminated absorbent, place in plastic lined metal drum and dispose of in accordance with instructions provided under DISPOSAL. Thoroughly scrub floor or other impervious surfaces with a strong industrial type detergent solution and rinse with water.

Liquid spills that soak into the ground should be dug-up, placed in plastic lined metal drums and disposed of in accordance with instructions provided under DISPOSAL.

Leaking containers should be separated from non-leakers and either the container or its contents transferred to a plastic lined drum or other non-leaking container and disposed of in accordance with instructions provided under DISPOSAL. Any recovered spilled liquid should be similarly collected and disposed of.

Do not contaminate water, foodstuffs, seed or feed by storage and disposal.

Disposal:

Materials resulting from the use of this product should be used according to label instructions if possible. Wastes that cannot be used or chemically reprocessed should be disposed of in a landfill approved for pesticide disposal or buried on site in a safe place so that it will not contaminate water supplies. All disposal should be in accordance with applicable Federal, State or local procedures.

Emptied container retains vapor and product residue. Observe all labeled safeguards until container is cleaned, reconditioned or destroyed. **DO NOT CUT OR WELD ON OR NEAR THIS CONTAINER.**

Metal Drums and Cans: Triple rinse container. Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Plastic Containers: Do not reuse container. Triple rinse container then puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities. Plastic may be burned or incinerated if permissible under state and local rules. If burned, stay out of smoke.

Bulk: Triple rinse emptied bulk containers. Then offer for recycling or reconditioning or disposal in a manner approved by state and local authorities.

ADDITIONAL COMMENTS

Environmental Toxicity Information:

Oral LD ₅₀ Goat:	4,860 mg/kg, Slightly Toxic
48-hr LD ₅₀ Honeybee:	>100 µg/bee, Practically Nontoxic
48-hr EC ₅₀ <i>Daphnia magna</i> (With Aeration):	37 mg/l, Slightly Toxic
48-hr EC ₅₀ <i>Daphnia magna</i> (Without Aeration):	24 mg/l, Slightly Toxic
48-hr EC ₅₀ <i>Gammarus pseudolimnaeus</i> :	42 mg/l, Slightly Toxic
96-hr TL ₅₀ Carp:	19.7 ppm, Slightly Toxic
96-hr LC ₅₀ Bluegill sunfish (Static):	14 mg/l, Slightly Toxic

(Additional Comments Continued On Next Page)

MATERIAL SAFETY DATA

Roundup® Herbicide

ADDITIONAL COMMENTS (Continued)

96-hr LC ₅₀ Bluegill sunfish (Flow-Through):	5.8 mg/l, Moderately Toxic
96-hr LC ₅₀ Rainbow trout (Static):	22 mg/l, Slightly Toxic
96-hr LC ₅₀ Rainbow trout (Flow-Through):	8.2 mg/l, Moderately Toxic
96-hr LC ₅₀ Channel catfish:	16 mg/l, Slightly Toxic
96-hr LC ₅₀ Fathead Minnow:	9.4 mg/l, Moderately Toxic
96-hr LC ₅₀ Crayfish:	>1,000 ppm, Practically Nontoxic

Carp contained in a static pond were unaffected at any time during a 90-day observation period following exposure by aerial application of Roundup herbicide at the normal use concentration. Tissue residue analyses indicated that glyphosate, the active ingredient in Roundup herbicide, will not bioaccumulate.

Immersion of chicken eggs at four different embryo ages (0, 6, 12 and 18 days) for about five seconds in 1 or 5% vol/vol Roundup in water solutions was reported to have no adverse effects on the hatchability or time to hatch of the eggs.

DATE: November, 1985

SUPERSEDES: March, 1982

MSDS NO.: M00007588

FOR ADDITIONAL NON-EMERGENCY INFORMATION, CALL: 314-694-4000

Although the information and recommendations set forth herein (hereinafter "Information") are presented in good faith and believed to be correct as of the date hereof, Monsanto Company makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will Monsanto Company be responsible for damages of any nature whatsoever resulting from the use of or reliance upon Information. NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS.