

MSDS Revision Date (dd/mm/yyyy): 13/07/2009

MATERIAL SAFETY DATA SHEET

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

Product identifier : **GLYFOS HERBICIDE**

Product Code(s) : None reported.

Product Use : Herbicide

Chemical Family : Mixture

Supplier's name and address:
Cheminova, Inc.
 One Park Drive, Suite 150
 PO Box 110566
 Research Triangle Park, NC, USA
 27709

Manufacturer's name and address:
 Refer to Supplier

Information Telephone No. : 919-474-6600 (8:00 AM - 5:00 PM, EST, Monday-Friday)

24 Hr. Emergency Tel # : Chemtrec 1-800-424-9300 (Within Continental U.S.); Chemtrec 703-527-3887 (Outside U.S.).
 For Medical Emergencies: (800) 303-6950

SECTION 2 - COMPOSITION/INFORMATION ON INGREDIENTS

<u>Ingredients</u>	<u>CAS #</u>	<u>% (weight)</u>	<u>ACGIH TLV</u>		<u>OSHA PEL</u>	
			<u>TWA</u>	<u>STEL</u>	<u>PEL</u>	<u>STEL</u>
Glyphosate as isopropylamine salt	38641-94-0	30.00 - 60.00	N/Av	N/Av	N/Av	N/Av
Surfactant	61791-26-2	2.00 - 7.00	N/Av	N/Av	N/Av	N/Av

Note: This product contains about 480 g/L of the active ingredient Glyphosate as its isopropylamine salt, equivalent to 360 g/L of the free acid Glyphosate (CAS # 1071-83-6).

SECTION 3 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Clear, yellow, viscous liquid. Odorless to slight amine-like odor.

Caution! Reacts with materials made of iron, galvanized steel and unlined steel, releasing flammable hydrogen gas, which may ignite. May cause eye irritation. May cause liver and kidney damage. May cause long-term adverse effects in the environment.
 Harmful to plants.

POTENTIAL HEALTH EFFECTS

Target organs : Eyes, skin, respiratory system, digestive system.

Routes of exposure : *Inhalation:* YES *Skin Absorption:* NO *Skin & Eyes:* YES *Ingestion:* YES

Signs and symptoms of short-term (acute) exposure

- Inhalation* : May cause irritation to the nose, throat and upper respiratory tract. Symptoms may include coughing and sneezing.
- Skin* : May cause mild skin irritation. Symptoms may include redness, itching and swelling.
- Eyes* : May cause moderate eye irritation. Symptoms will include pain, redness and tearing.
- Ingestion* : No exposure symptoms reported under normal conditions of use. Ingestion of large amounts may cause stomach irritation. Symptoms include nausea, vomiting and diarrhea.

Effects of long-term (chronic) exposure
 : Prolonged overexposure may cause liver and kidney effects.

Conditions aggravated by overexposure
 : Pre-existing skin, eye and respiratory disorders.

Carcinogenic status : See TOXICOLOGICAL INFORMATION, Section 11.

Additional health hazards : See TOXICOLOGICAL INFORMATION, Section 11.

Potential environmental effects
 : Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment. See ECOLOGICAL INFORMATION, Section 12.

SECTION 4 - FIRST AID MEASURES

Inhalation : Immediately remove person to fresh air. If symptoms develop, seek medical attention.

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- Skin contact** : Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Obtain medical attention if symptoms develop and persist. Wash contaminated clothing before re-use.
- Eye contact** : Immediately flush eyes with running water for at least 15 minutes. Get medical attention.
- Ingestion** : Do NOT induce vomiting. Have victim rinse mouth with water, then give one to two glasses of water to drink. Never give anything by mouth to an unconscious person. Seek immediate medical attention/advice.
- Notes For Physician** : Treat symptomatically.

SECTION 5 - FIRE FIGHTING MEASURES

Fire hazards/conditions of flammability : Combustible liquid. This material may burn when exposed to extreme heat, flame and other ignition sources. Closed containers may rupture if exposed to excess heat or flame due to a build-up of internal pressure. Reacts with materials made of iron, galvanized steel and unlined steel, releasing flammable hydrogen gas, which may ignite.

Flammability classification (OSHA 29 CFR 1910.1200)

- : Combustible Liquid Class III B.
- Flash point** : >235°F / >113°C
- Flash point Method** : estimated
- Lower flammable limit (% by vol.)** : N/Av
- Oxidizing properties** : None known.
- Flame Projection Length** : N/Ap
- Auto-ignition temperature** : N/Av
- Upper flammable limit (% by vol.)** : N/Av
- Flashback observed** : N/Ap

Explosion data: Sensitivity to mechanical impact / static discharge

- : Not expected to be sensitive to mechanical impact or static discharge.
- Suitable extinguishing media** : Carbon dioxide or dry chemical for small fires. For large fires, use water spray or foam.

Special fire-fighting procedures/equipment

- : Firefighters should wear proper protective equipment and self-contained breathing apparatus with full face piece operated in positive pressure mode. Move containers from fire area if safe to do so. Water spray may be useful in cooling equipment exposed to heat and flame. Avoid spreading burning liquid with water spray used for cooling purposes.

Hazardous combustion products

- : Carbon oxides; nitrogen oxides (NOx); Oxides of phosphorus; irritating fumes and smoke.

NFPA Rating

0 - Minimal	1 - Slight	2 - Moderate	3 - Serious	4 - Severe
: <i>Health:</i> 1 <i>Flammability:</i> 1 <i>Instability:</i> 0 <i>Special Hazards:</i> None				

SECTION 6 - ACCIDENTAL RELEASE MEASURES

- Personal precautions** : Restrict access to area until completion of clean-up. Ensure clean-up is conducted by trained personnel only. All persons dealing with clean-up should wear the appropriate protective equipment including self-contained breathing apparatus. Refer to Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION, for additional information on acceptable personal protective equipment.
- Environmental precautions** : Ensure spilled product does not enter drains, sewers, waterways, or confined spaces. If necessary, dike well ahead of the spill to prevent runoff into drains, sewers, or any natural waterway or drinking supply.
- Spill response/cleanup** : Remove all sources of ignition. Ventilate area of release. Stop the spill at source if it is safe to do so. Contain and absorb spilled material with inert, non-combustible absorbent material, such as sand. Sweep up and shovel into suitable containers for disposal. For a water spill, confine the spill immediately with booms. Notify the appropriate authorities as required.
- Prohibited materials** : None known.
- Special spill response procedures** : In case of a transportation accident, in the United States contact CHEMTREC at 1-800-424-9300 or International at 1-703-527-3887. If a spill/release in excess of the EPA reportable quantity is made into the environment, immediately notify the national response center in the United States (phone: 1-800-424-8002).
US CERCLA Reportable quantity (RQ): None known.

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SECTION 7 - HANDLING AND STORAGE

- Safe Handling procedures** : This material is a harmful liquid. Wear chemically resistant protective equipment during handling. Use only in well-ventilated areas. Avoid contact with skin, eyes and clothing. Do not breathe vapours or spray mist. Keep away from heat and flame. This product should be mixed, stored or applied using only stainless steel, fiberglass, plastic, or plastic lined containers and equipment. This product can react with containers made of iron, galvanized steel and unlined steel to produce flammable hydrogen gas. Avoid contact with incompatible materials. Use caution when opening cap. Keep containers tightly closed when not in use. Wash thoroughly after handling.
- Storage requirements** : Store in a cool, dry, well ventilated area. Keep away from excessive heat, open flames, sparks and other possible sources of ignition. Keep away from incompatibles. Storage area should be clearly identified, clear of obstruction and accessible only to trained and authorized personnel. Inspect periodically for damage or leaks. No smoking in the area.
- Incompatible materials** : Strong oxidizing agents; Alkalies; Iron; Steel (galvanized and unlined).
- Special packaging materials** : Always keep in containers made of the same materials as the supply container.

SECTION 8 - EXPOSURE CONTROLS AND PERSONAL PROTECTION

- Ventilation and engineering measures** : Provide sufficient ventilation to keep vapour concentration below the given TLV and/or PEL.
- Respiratory protection** : Not required under normal conditions of handling. In the event of an accidental discharge of the material which produces a heavy vapor or mist, workers should use respiratory protection. NIOSH-approved respirators are recommended. Seek advice from respiratory protection specialists.
- Skin protection** : Impervious gloves must be worn when using this product. Advice should be sought from glove suppliers.
- Eye / face protection** : Safety glasses with side-shields or chemical splash goggles.
- Other protective equipment** : Wear resistant clothing and boots. An eyewash station and safety shower should be made available in the immediate working area.
- General hygiene considerations** : Avoid breathing vapour or mist. Avoid contact with skin, eyes and clothing. Do not eat, drink, smoke or use cosmetics while working with this product. Upon completion of work, wash hands before eating, drinking, smoking or use of toilet facilities. Remove soiled clothing and wash it thoroughly before reuse. Do not take contaminated clothing home.
- Permissible exposure levels** : For individual ingredient exposure levels, see Section 2.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

- | | | | |
|---|--|---|--|
| Physical state | : Liquid | Appearance | : Clear, yellow, viscous liquid. |
| Odour | : Odorless to slight amine-like odor. | Odour threshold | : N/Av |
| pH | : 4.5 @ 20°C (1% solution) | | |
| Boiling point | : 235°F / 113°C | Specific gravity | : 1.165 g/cc @ 20°C |
| Melting/Freezing point | : <32°F / <0°C | Coefficient of water/oil distribution | : P = 4.5 x 10 ⁻⁴ (free Glyphosate acid); Log P = -3.3 (free Glyphosate acid) |
| Vapour pressure (mmHg @ 20° C / 68° F) | : 1.75 x 10 ⁻⁷ mmHg @ 25°C (free Glyphosate acid) | Solubility in water | : Miscible |
| Vapour density (Air = 1) | : N/Av | Evaporation rate (n-Butyl acetate = 1) | : N/Av |
| Volatile organic Compounds (VOC's) | : N/Av | Volatiles (% by weight) | : N/Av |

SECTION 10 - REACTIVITY AND STABILITY DATA

- Stability and reactivity** : Stable under the recommended storage and handling conditions prescribed. Reacts with materials made of iron, galvanized steel and unlined steel, releasing flammable hydrogen gas, which may ignite.
- Hazardous polymerization** : Will not occur.

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Conditions to avoid : Keep this product away from heat, sparks, flame, and other sources of ignition (e.g. pilot lights, electric motors, static electricity). This product should be mixed, stored or applied using only stainless steel, fiberglass, plastic, or plastic lined containers and equipment. This product can react with containers made of iron, galvanized steel and unlined steel to produce flammable hydrogen gas.

Materials To Avoid And Incompatibility

: Incompatible materials (see Section 7).

Hazardous decomposition products

: None known, refer to hazardous combustion products in Section 5.

SECTION 11 - TOXICOLOGICAL INFORMATION

Toxicological data : LD50 Oral (rat): >5000 mg/kg
 LD50 Dermal (rat): >2000 mg/kg
 LC50 Inhalation (rat): >4.86 mg/L/4 hrs (maximum attainable concentration - no signs of toxicity at this concentration)

Carcinogenic status : No components are listed as carcinogens by ACGIH, IARC, OSHA or NTP.

Reproductive effects : Not expected to have other reproductive effects.

Teratogenicity : Not expected to be a teratogen.

Mutagenicity : Not classifiable as a mutagen.

Epidemiology : Not available.

Sensitization to material : Not expected to be a skin or respiratory sensitizer.

Synergistic materials : Not available.

Irritancy : May cause eye and skin irritation. May cause irritation to upper respiratory system.

other important hazards : None known.

SECTION 12 - ECOLOGICAL INFORMATION

Environmental effects : The ecological characteristics of this product have not been fully investigated. The product should not be allowed to enter drains or water courses, or be deposited where it can affect ground or surface waters. This product is an herbicide. The active ingredient is: Glyphosate (as isopropylamine salt). The active ingredient is considered to be toxic to many plants, and non-toxic to fish, aquatic invertebrates, soil micro- and macroorganisms, birds, mammals and insects.

Important environmental characteristics : The active ingredient is rapidly deactivated by absorption to clay particles. The active ingredient binds strongly to soil. The active ingredient is not readily biodegradable. It undergoes slow degradation in the environment and in waste water treatment plants. No adverse effects are found at concentrations up to 100 g/L in waste water treatment plants. Degradation is mainly microbiological. Aerobic degradation is most important, but anaerobic degradation does also occur. The risk of bioaccumulation is considered to be low.

Ecotoxicological : The acute toxicity of the product is measured to be:

- Fish - 96-Hr LC50, Rainbow trout (*Salmo gairdneri*) = 18.6 mg/L (static)
- 21-day NOEC, Rainbow trout (*Salmo gairdneri*) = 0.43 - 0.81 mg/L
- 96-Hr LC50, Bluegill sunfish (*Lepomis macrochirus*) = 11.9 mg/L (static)
- Invertebrates - 48-Hr EC50, Daphnids (*Daphnia magna*) = 21.6 mg/L
- 21-day NOEC, Daphnids (*Daphnia magna*) = 1.5 mg/L
- Algae - 72-Hr IC50, Green Algae (*Scenedesmus subspicatus*) = 17.4 mg/L
- 96-Hr IC50, Green Algae (*Scenedesmus subspicatus*) = 2.2 mg/L
- Plants: 7-day EC50, Duckweed (*Lemna gibba*) = 27 mg/L
- Earthworms: 14-day LC50, (*Eisina foetida*) = >1000 mg/kg dry soil
- Birds: LD50, Japanese quail (*Coturnix japonica*) = 1900 mg/kg
- 5-day dietary LD50, Japanese quail (*Coturnix japonica*) = >5000 ppm in feed
- Bees - 48-Hr LD50, Worker honey-bees (*Apis mellifera*), acute oral = >100 µg/bee
- 24-Hr LD50, Worker honey-bees (*Apis mellifera*), topical = >20 µg/bee
- Bacteria: IC50, Activated sludge = >100 mg/kg

SECTION 13 - DISPOSAL CONSIDERATIONS



Handling for Disposal : Handle waste according to recommendations in Section 7.

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Methods of Disposal : Do not contaminate water, foodstuffs, feed or seed by storage or disposal. For disposable containers, triple rinse (or equivalent) containers and add rinse material to disposal tank. Follow any additional local, state or federal requirements for cleaning containers prior to disposal. Make the empty, rinsed container unusable for further use by puncturing. Dispose in accordance with all applicable federal, state, provincial and local regulations. Contact your local, state, provincial or federal environmental agency for specific rules.

RCRA : If this product, as supplied, becomes a waste in the United States, it may meet the criteria of a hazardous waste as defined under RCRA, Title 40 CFR 261. It is the responsibility of the waste generator to determine the proper waste identification and disposal method. For disposal of unused or waste material, check with local, state and federal environmental agencies.

SECTION 14 - TRANSPORTATION INFORMATION

Regulatory Information	UN Number	Shipping Name	Class	Packing Group	Label
49CFR/DOT	None	Not regulated.	Not regulated	none	
49CFR/DOT Additional information	None.				
TDG	None	Not regulated.	Not regulated	none	
TDG Additional information	None.				

SECTION 15 - REGULATORY INFORMATION

US Federal Information:

OSHA: This material is classified as hazardous under OSHA regulations (29CFR 1910.1200).

CERCLA Reportable Quantity (RQ) (40 CFR 117.302): Refer to supplier

SARA TITLE III: Sec. 302, Extremely Hazardous Substances, 40 CFR 355: No Extremely Hazardous Substances are present in this material.

SARA TITLE III: Sec. 311 and 312, MSDS Requirements, 40 CFR 370 Hazard Classes: Immediate (Acute) health hazard; Chronic Health Hazard. Under SARA Sections 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are 500 pounds for the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SARA TITLE III: Sec. 313, Toxic Chemicals Notification, 40 CFR 372: This material is not subject to SARA notification requirements, since it does not contain any Toxic Chemical constituents above de minimus concentrations.

US State Right to Know Laws:

California Proposition 65: To the best of our knowledge, this product does not contain any chemicals known to the State of California to cause cancer or reproductive harm.

International Information:

This product is a Pest Control Product and is not regulated as a Controlled Product under the Hazardous Products Act (HPA). For informational purposes, this product would have the following WHMIS classification:

Class D2B (Materials Causing Other Toxic Effects, Toxic Material)

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and this MSDS contains all the information required by the CPR.

SECTION 16 - OTHER INFORMATION

HMIS Rating : * - Chronic hazard 0 - Minimal 1 - Slight 2 - Moderate 3 - Serious 4 - Severe
 Health: *2 Flammability: 1 Reactivity: 0


Legend : ACGIH: American Conference of Governmental Industrial Hygienists
 CA: California
 CAS: Chemical Abstract Services
 CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1980
 CFR: Code of Federal Regulations

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DOT: Department of Transportation
 EPA: Environmental Protection Agency
 HMIS: Hazardous Materials Identification System
 HSDB: Hazardous Substances Data Bank
 IARC: International Agency for Research on Cancer
 Inh: Inhalation
 N/Ap: Not Applicable
 N/Av: Not Available
 NFPA: National Fire Protection Association
 NIOSH: National Institute of Occupational Safety and Health
 NTP: National Toxicology Program
 OSHA: Occupational Safety and Health Administration
 PEL: Permissible exposure limit
 RCRA: Resource Conservation and Recovery Act
 RTECS: Registry of Toxic Effects of Chemical Substances
 SARA: Superfund Amendments and Reauthorization Act
 STEL: Short Term Exposure Limit
 TDG: Canadian Transportation of Dangerous Goods Act & Regulations
 TLV: Threshold Limit Values
 TPQ: Threshold Planning Quantity
 TSCA: Toxic Substance Control Act
 TWA: Time Weighted Average
 WHMIS: Workplace Hazardous Materials Identification System

References

- : 1. ACGIH, Threshold Limit Values and Biological Exposure Indices
- 2. International Agency for Research on Cancer Monographs
- 3. Canadian Centre for Occupational Health and Safety, CCHInfoWeb databases (Chempendium, HSDB, RTECs).
- 4. Material Safety Data Sheet from manufacturer.
- 5. US EPA Title III List of Lists
- 6. California Proposition 65 List

<p><u>Prepared for:</u> Cheminova Inc PO Box 110566 One Park Drive, Suite 150 Research Triangle Park, NC 27709 Please direct all enquiries to Cheminova.</p>	
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Revision Information

: (M)SDS sections updated: All