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**In Case of Emergency, Call
1-800-327-8633 (FAST MED)**

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MSDS prepared by:
Department of Regulatory & Biological Assessment
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SECTION – 1: PRODUCT IDENTIFICATION

Product Identifier: GRAMOXONE® Liquid Herbicide
Registration Number: 8661 (Pest Control Products Act)
Chemical Class: A bipyridyl contact herbicide.

Formulation No.: A3879G

Active Ingredient(%): Paraquat Dichloride (25.5 %)
Chemical Name: 1,1'-dimethyl-4,4'-bipyridinium dichloride
Product Use: A non-residual water-based herbicide to be mixed with water for the control of many grasses and broadleaf weeds. Please refer to product label for further details.

CAS No.: 1910-42-5

SECTION – 2 : COMPOSITION/INFORMATION ON INGREDIENTS

Material	OSHA PEL	ACGIH TLV	Other	NTP/IARC/OSHA Carcinogen	WHMIS†
Paraquat Emetic Technical (CAS No. 27277-00-5) (< 0.1 %)	Not Established	Not Established	0.02 mg/m ³ TWA***	No	Not Established
Paraquat Dichloride (25.5 %)	0.5 mg/m ³ TWA (respirable; skin; as paraquat)	0.1 mg/m ³ TWA (respirable); 0.5 mg/m ³ TWA (total)	0.08 mg/m ³ TWA (respirable); 0.5 mg/m ³ TWA (total)***	No	Not Established

*** Syngenta Occupational Exposure Limit (OEL)

† Material listed in Ingredient Disclosure List under Hazardous Products Act.

Ingredients not precisely identified are proprietary or non-hazardous. Values are not product specifications.

SECTION – 3: HAZARDS IDENTIFICATION

Symptoms of Acute Exposure

Fatal if inhaled. **Prompt medical attention is required.** Mucosal irritation or nose bleeds may occur. Harmful or fatal if swallowed or absorbed through the skin. Severely irritating or corrosive to the eyes and skin. Untreated spilled material can dry to a highly irritating dust.

Hazardous Decomposition Products

Can decompose at high temperatures forming toxic gases, including carbon dioxide, carbon monoxide, chlorine, hydrogen chloride; possible trace amounts of phosgene, nitrogen oxides, ammonia and other toxic and noxious fumes.

Physical Properties

Appearance: Dark blue / green liquid.

Odour: Characteristic of pyridine bases.

Unusual Fire, Explosion and Reactivity Hazards

Hydrolyzes in alkaline media. This product reacts with aluminum to produce hydrogen gas. Do not mix or store in containers or systems made of aluminum or having aluminum fittings.

During a fire, irritating and possibly toxic gases may be generated by thermal decomposition or combustion. The product mixes with water. Firefighting water may contaminate the environment.

Potential Health Effects

Relevant routes of exposure: Skin, eyes, mouth, lungs.

Adverse health effects from exposure to product or ingredients of product:

Repeat exposure may cause organ damage.

SECTION – 4: FIRST AID MEASURES

IF POISONING IS SUSPECTED, immediately contact the poison information centre, doctor or nearest hospital. Have the product container, label or Material Safety Data Sheet with you when calling Syngenta, a poison control center or doctor, or going for treatment. Tell the person contacted the complete product name, and the type and amount of exposure. Describe any symptoms and follow the advice given. Call the Syngenta Emergency Line [**1-800-327-8633 (1-800-FASTMED)**], for further information.

EYE CONTACT: Corrosive to eyes. Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after 5 minutes, then continue rinsing eye. Call Syngenta, a poison control center or doctor for treatment advice immediately.

SKIN CONTACT: Moderately to severely irritating to skin. Remove contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Contact a physician or contact a poison control centre for treatment advice immediately.

INHALATION: Move person to fresh air. Apply artificial respiration if required, preferably mouth-to-mouth, and obtain medical attention. Immediately call a poison control centre or physician for further treatment advice.

INGESTION: **SPEED IS ESSENTIAL. Immediate medical attention is required.** If available, give an adsorbent such as activated charcoal, bentonite or Fuller's Earth. Call a poison control center or doctor immediately for treatment advice immediately. Never give anything by mouth to an unconscious person.

NOTES TO PHYSICIAN:

Refer to the booklet 'Paraquat Poisoning. A Practical Guide to Diagnosis, First Aid and Hospital Treatment' (<http://www.syngenta.com/pqmedguide/>). Administer either activated charcoal (100 g for adults or 2 g/kg body weight in children) or Fuller's Earth (15% solution; 1 L for adults or 15 mL/kg body weight in children). NOTE: the use of gastric lavage without administration of an adsorbent has not shown any clinical benefit. Do not use supplemental oxygen. Ingestion may cause death by multi-organ failure and circulatory collapse within 48 hours or by a delayed proliferating fibrosis of the lung within 1-3 weeks. Immediate effects of ingestion are usually vomiting, abdominal discomfort, soreness and inflammation of the mouth, throat and esophagus, difficulty in swallowing and later, diarrhea. Kidney and liver damage may appear 1-3 days post ingestion.

This material has a delayed eye irritation effect. May lead to ulceration of cornea and conjunctival epithelium giving rise to secondary infection. Although healing may be slow, the injury is superficial and with proper medical care recovery will be complete, even in severe cases. Eye splashes from concentrated material should be treated by an eye specialist after initial treatment. With the possibility of late onset corneal ulceration it is advised that patients with paraquat eye injuries are reviewed by an eye specialist the day after first presentation. Use treatment that is appropriate to chemical burns. Treatment may need to continue for several months. Intact skin is an effective barrier to paraquat, however contact with irritated or cut skin or repeated contact with intact skin may result in poisoning.

MEDICAL CONDITIONS KNOWN TO BE AGGRAVATED:

None known.

SECTION – 5: FIRE FIGHTING MEASURES

Flash point and method: Not applicable.

Upper and lower flammable (explosive) limits in air: Not applicable.

Auto-ignition temperature: Not available.

Flammability: Not flammable as an aqueous solution. Dried product may support combustion.

Hazardous combustion products: Can decompose at high temperatures forming toxic gases, including carbon dioxide, carbon monoxide, chlorine, hydrogen chloride; possible trace amounts of phosgene, nitrogen oxides, ammonia and other toxic and noxious fumes.

Conditions under which flammability could occur: Keep fire exposed containers cool by spraying with water.

Extinguishing media: Technical aqueous solutions present no ignition hazards. The pure material may support combustion. Keep fire-exposed containers cool by spraying with water. For small fires, use foam, carbon dioxide or dry powder extinguishant. For large fires, use foam or water-fog; avoid use of water jet. Wear full protective clothing and self-contained breathing apparatus. Evacuate nonessential personnel from the area to prevent human exposure to fire, smoke, fumes or products of combustion. Prevent use of contaminated buildings, area, and equipment until decontaminated. Water runoff can cause environmental damage. Contain run-off water with, for example, temporary earth barriers.

Sensitivity to explosion by mechanical impact: No.

Sensitivity to explosion by static discharge: No.

SECTION – 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions: Untreated spilled material can dry to a highly irritating dust. Make sure all personnel involved in the spill cleanup follow good industrial hygiene practices. A small spill can be handled routinely. Use adequate ventilation and wear equipment and clothing as described in Section 8 and/or the product label.

Procedures for dealing with release or spill: Untreated spilled material can dry to a highly irritating dust. Contain the spill to prevent material from spreading or contaminating soil or from entering sewage and drainage systems or any body of water. Pump or scoop large amounts of liquid into a disposable container. Absorb remaining liquid or smaller spills with clay, sand or vermiculite. Wash area with detergent and water. On soils, small amounts will naturally decompose. For large amounts, skim off the upper contaminated layer and collect for disposal. Once all material is cleaned up and placed in a disposal container, seal container and arrange for disposal. Spillages or uncontrolled discharges into watercourses must be alerted to the appropriate regulatory body.

Deactivating Chemicals: Bentonite, Fuller's Earth.

SECTION – 7: HANDLING AND STORAGE

Handling practices: KEEP OUT OF REACH OF CHILDREN. Prevent eating, drinking, tobacco use, and cosmetic application in areas where there is a potential for exposure to the material. Avoid breathing vapours or spray mist. Wear full protective clothing and equipment (see Section 8). After work, rinse gloves and remove protective equipment, and wash hands thoroughly with soap and water after handling, and before eating, tobacco use, drinking, applying cosmetics or using the toilet. Wash contaminated clothing before re-use and separate from household laundry. Keep containers closed when not in use. Protect product, wash or rinse water, and contaminated materials from uncontrolled release into the environment, or from access by animals, birds or unauthorized people.

Appropriate storage practices/requirements: Store above 0°C in original container only in a well-ventilated, cool, dry, secure area. Protect from heat, sparks and flame. Do not expose sealed containers to temperatures above 40 °C. Protect from freezing. Keep separate from other products to prevent cross contamination. Rotate stock. Clean up spilled material immediately.

National Fire Code classification: Not required.

SECTION – 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Applicable control measures, including engineering controls: Ensure work areas have ventilation, containment, and procedures sufficient to maintain airborne levels below the TLV. Warehouses, production area, parking lots and waste holding facilities must have adequate containment to prevent environmental contamination. Provide separate shower and eating facilities.

THE FOLLOWING RECOMMENDATIONS FOR EXPOSURE CONTROLS/PERSONAL PROTECTION ARE INTENDED FOR THE MANUFACTURE, FORMULATION, PACKAGING AND USE OF THIS PRODUCT.

CONSULT THE PRODUCT LABEL FOR COMMERCIAL APPLICATIONS AND/OR ON-FARM APPLICATIONS.

Personal protective equipment for each exposure route:

General: Avoid breathing dust, vapours or aerosols. Avoid contact with eye, skin and clothing. Wash thoroughly after handling and before eating, drinking, applying cosmetics or handling tobacco.

INGESTION: Do not eat, drink, handle tobacco, or apply cosmetics in areas where there is a potential for exposure to this material. Always wash thoroughly after handling.

EYES: Where eye contact is likely, use chemical splash goggles. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

SKIN: Where contact is likely, wear chemical-resistant gloves (such as nitrile or butyl), coveralls, socks and chemical-resistant footwear. For overhead exposure, wear chemical-resistant headgear.

INHALATION: A respirator is not normally required when handling this substance. Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below exposure limits. A NIOSH-certified combination air-purifying respirator with an N, P, R or HE class filter and an organic vapour cartridge may be used under certain circumstances where airborne concentrations are expected to exceed exposure limits (e.g. emergency spills)..

SECTION – 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Dark blue / green liquid.

Formulation Type: Solution Concentrate.

Odour: Characteristic of pyridine bases.

pH: 6.5 – 7.5.

Vapour pressure and reference temperature: 7.5×10^{-8} mmHg @ 25 °C (Paraquat Dichloride).

Vapour density: Not available.

Boiling point: Approx. 100 °C.

Melting point: Not applicable.

Freezing point: Approx. -9 °C.

Specific gravity or density: 1.06 g/mL.

Evaporation Rate: Not available.

Water/oil partition coefficient: Not available.

Odour threshold: Not available.

Viscosity: 270 mPas (or cps) @ 20°C

Solubility in Water: Essentially miscible

SECTION – 10: STABILITY AND REACTIVITY

Chemical stability: Stable under normal use and storage conditions.

Conditions to avoid: Store above 0°C. Decomposed by alkali and in the presence of UV light. Compound inactivated by adsorption onto inert clay.

Incompatibility with other materials: Reducing agents. Corrosive to aluminum.

Hazardous decomposition products: Can decompose at high temperatures forming toxic gases, including carbon dioxide, carbon monoxide, chlorine, hydrogen chloride; possible trace amounts of phosgene, nitrogen oxides, ammonia and other toxic and noxious fumes.

Hazardous polymerization: Will not occur.

SECTION – 11: TOXICOLOGICAL INFORMATION

Acute toxicity/Irritation Studies (Finished Product):

Ingestion:	<u>Moderately Acutely Toxic</u>	
	Oral (LD50 Rat):	612 mg/kg body weight
Dermal:	<u>Moderately Acutely Toxic</u>	
	Dermal (LD50 Rat):	590 mg/kg body weight

Inhalation:	<u>Highly Acutely Toxic</u>	
	Inhalation (LC50 Rat):	0.0006 – 0.0014 mg/L based on paraquat ion
Eye Contact:	<u>Severely Irritating (Rabbit)</u>	
Skin Contact:	<u>Moderately to Severely Irritating (Rabbit)</u>	
Skin Sensitization:	<u>Not a Sensitizer (Guinea Pig)</u>	

Reproductive/Developmental Effects

Paraquat Dichloride: A 3-generation reproduction study showed no evidence of fertility or reproductive effects at doses below that causing maternal toxicity. Reproductive NOEL was above 7.5 mg/kg/day, the highest dose level.

Chronic/Subchronic Toxicity Studies

Paraquat Dichloride: Rodent studies showed signs of irritation in 21-day dermal studies. In a 2.5 year chronic study, rats showed evidence of cataracts, body weight reduction and lung effects (alveolar macrophage infiltration) at 75 ppm and above. A 90-day dog diet study showed evidence of lung effects leading to alveolar collapse and death at 3 mg/kg/day. Chronic pneumonitis was seen in a 1-year dog study at 0.93 mg/kg/day and above.

Carcinogenicity

Paraquat Dichloride: No evidence in the rat or mouse.

Other Toxicity Information:

None.

Toxicity of Other Components

The acute toxicity test results reported in Section 11, above, for the finished product take into account any acute hazards related to the “other components” in the formulation.

Paraquat Emetic:

Toxic if swallowed. Slightly irritating to skin and eyes. Inhalation of dust may cause nausea and vomiting.

Other materials that show synergistic toxic effects together with the product: None known.

Target Organs

Active Ingredients

Paraquat Dichloride: Lung, kidney, skin, eyes.

Inert Ingredients

Paraquat Emetic: Skin, eye, respiratory system.

SECTION – 12: ECOLOGICAL INFORMATION

Summary of Effects

GRAMOXONE is a non-volatile, fast acting herbicide that is mixed with water and applied as a spray for control of many grasses and broadleaf weeds. The active ingredient, paraquat, is practically non-toxic to insects (bees), moderately toxic to birds, and highly toxic to fish and aquatic invertebrates.

Eco-Acute Toxicity

Paraquat Dichloride:

Green Algae 4-day EC ₅₀	0.32 mg/L
Bees LC ₅₀ /EC ₅₀ (Contact)	48 µg/bee
Invertebrates (Water Flea) LC ₅₀ /EC ₅₀	1.2 mg/L
Fish (Trout) 96-hr LC ₅₀ /EC ₅₀	55 mg/L

Fish (Bluegill) 96-hr LC ₅₀ /EC ₅₀	13 mg/L
Birds (8-Day Dietary - Bobwhite Quail) LC ₅₀ /EC ₅₀	176 mg/kg
Birds (8-Day Dietary - Mallard Duck) LC ₅₀ /EC ₅₀	4,048 mg/kg

Environmental Fate

The active ingredient, paraquat, has a low bioaccumulation potential. It is immobile in soil, and is not persistent in water but is moderately persistent in soil. Paraquat is rapidly adsorbed and de-activated in soil. The main routes of degradation are by microbial degradation and formation of bound residues.

SECTION – 13: DISPOSAL CONSIDERATIONS

Waste disposal information: Do not reuse empty containers unless they are specifically designed to be refillable. Empty container retains product residue. Triple rinse, or equivalent, empty container, return rinse water to dilution mixture, and dispose of dilution mixture as a hazardous waste if it cannot be disposed of by use according to label instructions. Dispose of empty containers in accordance with local regulations. Consult provincial environment ministry for advice on waste disposal. Industrial/commercial waste may be handled at licensed facilities only. Waste shipments must be securely packaged and properly labelled. Only licensed carriers may be used, and proper documents must accompany the shipment.

SECTION – 14 : TRANSPORT INFORMATION

Shipping information such as shipping classification:

TRANSPORTATION OF DANGEROUS GOODS CLASSIFICATION - ROAD/RAIL

Proper Shipping Name: Corrosive Liquid, Toxic, N.O.S. (paraquat solution), Class 8 (6.1), UN2922, PG III

SECTION – 15: REGULATORY INFORMATION

WHMIS classification for product: Exempt

This MSDS has been prepared in accordance with WHMIS requirements, but the data are presented under 16 headings.

Pest Control Products (PCP) Act Registration No.: 8661

SECTION – 16: OTHER INFORMATION

The information contained herein is offered only as a guide to the handling of this specific material and has been prepared in good faith by technically knowledgeable personnel. It is not intended to be all-inclusive and the manner and conditions of use and handling may involve other and additional considerations. No warranty of any kind is given or implied and Syngenta will not be liable for any damages, losses, injuries or consequential damages which may result from the use of or reliance on any information contained herein. This Material Safety Data Sheet is valid for three years. This product is under the jurisdiction of the Pest Control Products Act and is exempt from the requirements for a WHMIS compliant MSDS. Hazardous properties of all ingredients have been considered in the preparation of this MSDS. Read the entire MSDS for the complete hazard evaluation of this product.

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