MATERIAL SAFETY DATA SHEET

Syngenta Canada Inc.
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In Case of Emergency, Call
1-800-327-8633 (FAST MED)

Date of MSDS Preparation (Y/M/D): 2013-12-31

MSDS prepared by:
Department of Regulatory & Biological Assessment
Syngenta Canada Inc.

For further information contact:
1-87-SYNGENTA (1-877-964-3682)

SECTION – 1: PRODUCT IDENTIFICATION

Product Identifier: REGLONE ION
Formulation No.: A1412H
Registration Number: 30158 (Pest Control Products Act)
Chemical Classes: A bipyridilium (dipyridilium) contact herbicide.

Active Ingredient (%): Diquat Dibromide (31.9 %) CAS No.: 85-00-7
Chemical Name: 6,7 dihydrodipyrido(1,2-a:2’,1’-c)pyrazineddium dibromide

Product Use: Desiccation of Pulse, Oilseed and Legume Forage Seed Crops, Weed Control in Vegetable and Field Crops, Control of Corn Spurry in Oats and Weed Control in Non-crop Land (rights-of-way for transportation or utility corridors, airports, wasteland, garbage dumps and industrial parks).

SECTION – 2: COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Material</th>
<th>OSHA PEL</th>
<th>ACGIH TLV</th>
<th>Other (total)</th>
<th>Other (0.5 total; 0.08 respirable)***</th>
<th>NTP/IARC/OSHA Carcinogen</th>
<th>WHMIS†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diquat Dibromide (31.9%)</td>
<td>Not Established</td>
<td>0.5 mg/m³ TWA (total)</td>
<td>0.5 mg/m³ TWA (0.5 total; 0.08 respirable)***</td>
<td>Not Established</td>
<td>No</td>
<td>Not Established</td>
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</tbody>
</table>

** Recommended by NIOSH
*** 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
Toxic if inhaled. Harmful if swallowed. Irritating to eyes and skin. May cause respiratory tract irritation.

Hazardous Decomposition Products
Flammable hydrogen gas may be formed on contact with incompatible metals. See “Conditions to Avoid,” Section 10.

Physical Properties
Appearance: Red brown to dark brown liquid.
Odour: Not determined.

Unusual Fire, Explosion and Reactivity Hazards
Flammable hydrogen gas may be formed on contact with incompatible metals. See “Conditions to Avoid,” Section 10.
During a fire, irritating and possibly toxic gases may be generated by thermal decomposition or combustion.
**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:** Flush eyes with clean water, holding eyelids apart for a minimum of 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. Obtain medical attention immediately if irritation persists.

**SKIN CONTACT:** Immediately remove contaminated clothing and wash skin, hair and fingernails thoroughly with soap and water. Flush skin with plenty of water for 15-20 minutes. Call Syngenta, a poison control centre or doctor for treatment advice.

**INHALATION:** Move victim to fresh air. If not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. Call Syngenta, a poison control centre or doctor for treatment advice.

**INGESTION:** If swallowed, immediately contact Syngenta, a poison control centre, doctor or nearest hospital for treatment advice. Have person sip a glass of water if able to swallow. Do not give anything by mouth to an unconscious person. Do not induce vomiting unless directed by a physician or a poison control center. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer water.

**NOTES TO PHYSICIAN:**
To be effective, treatment for ingestion of the product must begin IMMEDIATELY.
Administer either activated charcoal (100g for adults or 2g/kg body weight in children) or Fuller's Earth (15% solution; 1 litre for adults or 15ml/kg body weight in children).

**MEDICAL CONDITIONS KNOWN TO BE AGGRAVATED:**
None known.

**SECTION – 5: FIRE FIGHTING MEASURES**

**Flash point and method:** Not available.
**Upper and lower flammable (explosive) limits in air:** Not applicable.
**Auto-ignition temperature:** Not available.
**Flammability:** Not available.
**Hazardous combustion products:** Flammable hydrogen gas may be formed on contact with incompatible metals. See “Conditions to Avoid,” Section 10. During a fire, irritating and possibly toxic gases may be generated by thermal decomposition or combustion.
**Conditions under which flammability could occur:** Keep fire exposed containers cool by spraying with water.
**Extinguishing media:** Use water fog or mist, (avoid use of water jet), foam, carbon dioxide, dry powder or halon extinguishant. 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:**
**Sensitivity to explosion by static discharge:**
SECTION – 6: ACCIDENTAL RELEASE MEASURES

**Personal Precautions:** Make sure all personnel involved in the spill cleanup follow good industrial hygiene practices. A small spill can be handled routinely. Use adequate ventilation, wear suitable protective clothing and equipment as described in Section 8 and/or the product label.

**Procedures for dealing with release or spill:**
Control the spill at its source. Contain the spill to prevent from spreading or contaminating soil or from entering sewage and drainage systems or any body of water. Clean up spills immediately, observing precautions outlined in Sections 7 and 8. Pump or scoop large amounts of liquid into a disposable container. Absorb remaining liquid or smaller spills with clay, sand or vermiculite. Scoop or sweep up material and place into a disposal container. Wash area with detergent and water. Pick up wash liquid with additional absorbent and place into compatible disposal container. 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 reported to the appropriate regulatory body.

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:** Spray solutions of this product should be mixed, stored and applied using only plastic, plastic-lined steel, stainless steel or fibreglass plastic containers. Concentrate should not be stored or maintained in long-term contact with galvanized steel, carbon steel, aluminium, brass or cast iron.

Store in original container only in a well-ventilated, cool, dry, secure area. Protect from heat, sparks and flame. Do not expose containers to temperatures below -10 °C or above 40 °C. Protect from sun and humidity. PREVENT PRODUCT FROM FREEZING. Separate from other products to prevent cross contamination. Rotate stock. Clean up spilled material immediately.

**National Fire Code classification:**

SECTION – 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

**Applicable control measures, including engineering controls:** This product is intended for use in on-farm operations. 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 possible, 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 (such as nitrile or butyl) gloves, 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 or R 95 or HE class filter and an organic vapor cartridge may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air-purifying respirators is limited. Use a pressure demand atmosphere-supplying respirator if there is any potential for uncontrolled release, exposure levels are not known, or under any other circumstances where air-purifying respirators may not provide adequate protection.

SECTION – 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Red brown to dark brown liquid.
Formulation Type: Liquid
Odour: Not determined.
pH: 6.0.
Vapour pressure and reference temperature: Diquat Dibromide: $<10^{-8}$ mmHg @ 25 °C

Vapour density: Not available.
Boiling point: Not available.
Melting point: Not applicable.
Freezing point: Not available.
Specific gravity or density: 1.18 g/mL
Evaporation Rate: Not available.
Water/oil partition coefficient: Log Kow = -4.6 (Diquat Dibromide)

Odour threshold: Not available.
Viscosity: 470 mPas
Solubility in Water: Diquat Dibromide: 718,000 mg/L @ 20 °C at pH 7.2

SECTION – 10: STABILITY AND REACTIVITY

Chemical stability: Stable under normal use and storage conditions.
Conditions to avoid: Concentrate should not be stored in galvanized steel, carbon steel or aluminum. Brass and/or cast iron fittings should not be used. Spray solutions should not be mixed, stored or applied in containers other than plastic, plastic-lined steel, stainless or fiberglass/plastic.
Incompatibility with other materials: See “Conditions to Avoid”, Section 10.
Hazardous decomposition products: Flammable hydrogen gas may be formed on contact with incompatible metals. See “Conditions to Avoid”, Section 10.
Hazardous polymerization: Will not occur.

SECTION – 11: TOXICOLOGICAL INFORMATION

Acute toxicity/Irritation Studies (Finished Product):

**Ingestion:**
- **Low AcuteToxicity**
  - Oral (LD50 Female Rat): 876 mg/kg body weight (based data obtained from similar substances)

**Dermal:**
- **Low AcuteToxicity**
  - Dermal (LD50 Rat): > 2,000 mg/kg body weight

**Inhalation:**
- **Low AcuteToxicity**
  - Inhalation (LC50 Rat): 0.63 mg/L air - 4 hrs (based on data obtained from similar substances)

**Eye Contact:** Moderately Irritating (Rabbit)

**Skin Contact:** Moderately Irritating (Rabbit)
Skin Sensitization: Not a Sensitizer in animal tests (Guinea Pig), (based on data obtained from similar substances)

Reproductive/Developmental Effects
Diquat Dibromide: Mutagenicity: No evidence in in vivo assays.
Development Toxicity: In rabbit studies a small percentage of fetuses had minor defects at 3 and 10 mg ion/kg/d.

Chronic/Subchronic Toxicity Studies
Diquat Dibromide: Kidney weight decreases and cataracts seen in dogs at 12.5 mg ion/kg/d.
No evidence for neurotoxic effects in rats dosed up to 400 ppm ion in the diet for 13 weeks.

Carcinogenicity
Diquat Dibromide: No evidence of carcinogenicity in rat and mouse studies.

Other Toxicity Information:
None.

Toxicity of Other Components
Not applicable.

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

Target Organs
Active Ingredients
Diquat Dibromide: Eye, kidney.

Inert Ingredients
Not Applicable

SECTION – 12: ECOLOGICAL INFORMATION

Summary of Effects
REGLONE ION is a non-selective contact herbicide for use in a number of crops for control of weeds. The active ingredients, diquat dibromide, are moderately toxic to birds, and are toxic to algae, fish and aquatic invertebrates (water flea).

Eco-Acute Toxicity
Diquat Dibromide:

| Invertebrates (Water Flea) 48-hr LC50/EC50 | 1.2 ppm |
| Fish (Rainbow Trout) 96–hr LC50/EC50       | 6.1 ppm |
| Birds (5-day dietary - Mallard Duck) LC50/EC50 | 1,570 ppm |

Environmental Fate
Diquat dibromide has a low bioaccumulation potential, low mobility and high persistence in soil, but is non-persistent in water. Under field conditions, diquat dibromide is almost immediately bound to soil or vegetation. Tightly bound residues are not biologically available, so the herbicide is deactivated on soil, and bound residues are resistant to microbial degradation. The soil dissipation half-life exceeds 3 years. Dissipation half-life in water is 1-2 days as the material is bound to sediment and deactivated.

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, N.O.S. (diquat dibromide)
Class: 8
UN#: UN1760
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.

Other regulations; restrictions and prohibitions

Pest Control Products (PCP) Act Registration No: 30158

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.

Prepared by: Syngenta Canada Inc.
1-87-SYNGENTA (1-877-964-3682)

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