

MATERIAL SAFETY DATA SHEET

SECTION 1 — PRODUCT AND COMPANY IDENTIFICATION

Product identifier: BOLTON™ insecticide

Product use: Insecticide.

Manufacturer's name and address:

Cheminova Inc.

P.O. Box 110566

One Park Drive; Suite 150

Research Triangle Park, NC 27709

Phone #: (919) 474-6600 (8 AM to 5:00 PM EST, Monday to Friday)

Emergency Telephone #: 1-866-303-6950 (Medical Emergencies)
1-800-424-9300 (24 Hr. Chemtrec Number)

MSDS Prepared by: Cheminova Inc.

MSDS Preparation date: May 11, 2011

Revision date: March 1, 2012

Revision reasons: Update

SECTION 2 — HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Yellow liquid, aromatic odor.

May be harmful if inhaled or swallowed. May cause eye irritation.

Toxic to birds, fish, aquatic invertebrates, aquatic life stages of amphibians and highly toxic to bees.

POTENTIAL HEALTH EFFECTS

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

Signs and symptoms of short-term (acute) exposure:

Inhalation: BOLTON™ insecticide is a cholinesterase inhibitor of moderate mammalian toxicity. The chlorpyrifos content can affect you when breathed in and can cause organophosphorous poisoning. Symptoms of poisoning may include headache, nausea, vomiting, blurred vision, tightness in chest, drooling, frothing of mouth and nose, convulsions, coma and death.

Skin contact: Direct skin contact may cause slight irritation. The chlorpyrifos content can be rapidly absorbed through all skin surfaces. Causes symptoms similar to those listed for inhalation.

Eye contact: Direct eye contact causes irritation. The chlorpyrifos content can be rapidly absorbed through all skin and eye surfaces. Causes symptoms similar to those listed for inhalation.

Ingestion: The chlorpyrifos content is poisonous through ingestion. Causes symptoms similar to those listed for inhalation.

Effects of long-term (chronic) exposure: Prolonged or repeated overexposure may cause behavioral changes and functional changes to the central and peripheral nervous systems..

Carcinogenicity: See TOXICOLOGICAL INFORMATION (Section 11).

Other important hazards: Cholinesterase inhibitor. May cause Central Nervous System depression. May cause damage to the peripheral nervous system. See TOXICOLOGICAL INFORMATION (Section 11).

Potential environmental effects: Chlorpyrifos is toxic to birds, fish, aquatic invertebrates, aquatic life stages of amphibians and highly toxic to bees. See ECOLOGICAL INFORMATION (Section 12)..

SECTION 3 — COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients	CAS #	% (weight)	ACGIH TLV (mg/m3)	OSHA PEL (mg/m3)
Chlorpyrifos	2921-88-2	<50%	0.1 (inhalable fraction, vapor)	Not listed
Gamma-cyhalothrin	76703-62-3	<5%	Not listed	Not listed
Additional ingredients, including: 1,2,4-Trimethylbenzene	95-63-6	22	123	Not listed

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1,3,5-Trimethylbenzene	108-67-8	7	123	Not listed
Cumene	98-82-8	3	246	245

These materials are classified as hazardous under OSHA regulations (29CFR 1910.1200).

SECTION 4 — FIRST AID MEASURES

Inhalation: Immediately remove victim to fresh air. If breathing has stopped, begin artificial respiration immediately. Transport to a clinic or hospital immediately.

Skin: Immediately flush skin with soap and running water for 15-20 minutes, while removing contaminated clothing and shoes. Obtain medical attention immediately. Thoroughly clean contaminated clothing before re-use.

Eyes: Immediately flush eyes with running water for at least 30 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Get medical attention immediately, preferably from an ophthalmologist.

Ingestion: If ingested, have victim rinse mouth, then drink 6 to 8 ounces of water. Induce vomiting immediately only under the direct supervision of qualified medical personnel. Never give anything by mouth if victim is unconscious or convulsing. Transport to a clinic or hospital immediately.

Note to physician: BOLTON™ insecticide, due to chlorpyrifos content, is a cholinesterase inhibitor affecting the central and peripheral nervous systems and producing respiratory and cardiac depression. Decontamination procedures such as whole body washing, gastric lavage and administration of activated charcoal are often required. If symptoms are present, administer atropine sulphate in large doses. Two to four mg intravenously or intramuscularly as soon as possible. Repeat at 5 to 10 minute intervals until signs of atropinization appear and maintain full atropinization until all organophosphorous is metabolised. Obidoxime chloride (Toxogonin), alternatively pralidoxime chloride (2-PAM), is a pharmacological antidote and may be administered as an adjunct to, but not a substitute for atropine, which is a symptomatic and often life-saving antidote. At first sign of pulmonary edema, the patient should be given supplemental oxygen and treated symptomatically. Continued absorption of BOLTON™ insecticide may occur and relapse may occur after initial improvement. **VERY CLOSE SUPERVISION OF THE PATIENT IS INDICATED FOR AT LEAST 48 HOURS.**

The product contains petroleum distillates which may pose an aspiration pneumonia hazard.

SECTION 5 — FIRE FIGHTING MEASURES

Flash point (Method): 127° F (53° C) (Pensky-Martens closed cup)

Lower flammable limit (% by volume): Not available.

Upper flammable limit (% by volume): Not available.

Auto-ignition temperature: Not available

Suitable extinguishing media: For small fires, use dry chemical or carbon dioxide. For large fires, use water spray or foam. Avoid heavy hose streams.

Special fire-fighting procedures/equipment: Firefighters should wear proper chemically protective equipment and self-contained breathing apparatus operated in positive pressure mode. Move containers from fire area if it can be done without risk. Dike area to prevent water run-off. Water spray may be useful in cooling equipment and containers. Avoid spreading burning material with water jet.

Hazardous combustion products: The essential breakdown products are volatile, toxic, irritant, malodorous and inflammable compounds such as nitrogen oxides, hydrogen chloride, ethyl mercaptan, diethyl sulphide, sulphur dioxide, hydrogen cyanide, carbon monoxide, carbon dioxide and various chlorinated and fluorinated organic compounds.

SECTION 6 — ACCIDENTAL RELEASE MEASURES

Personal precautions: Stop the source of the spill immediately if safe to do so. Remove sources of ignition. Avoid and reduce mist formation as much as possible. 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 chemically protective equipment. 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. Dike far ahead of the spill for later recovery or disposal. Washings must be prevented from entering surface water drains. Uncontrolled discharge into water courses must be alerted to the appropriate regulatory body.

Spill response/Cleanup: It is recommended to have a predetermined plan for the handling of spills. Eliminate all sources of heat, sparks and flame. Ventilate area of release. Stop leak if you can do so without risk. Contain the spill to prevent any further contamination of surface soil or water. Notify the appropriate authorities. For spills on the floor

SECTION 6 — ACCIDENTAL RELEASE MEASURES CONTINUED

or other impervious surfaces, absorb spill with inert, non-combustible absorbent material, such as universal binder, hydrated lime, Fuller's earth or other absorbent clays. Scoop up and place contaminated absorbent material into suitable containers for later disposal (see Section 13). Rinse spill area with soda lye. Do not flush to sewer or allow to enter confined spaces. Large spills that soak into the ground should be dug up, placed in suitable containers and disposed of appropriately (see Section 13). Spills in water should be contained as much as possible by isolation of the contaminated water. The contaminated water must be collected and removed for treatment or disposal. Uncontrolled discharge into water courses must be alerted to the appropriate regulatory body. The used containers should be properly closed and labelled. Notify the appropriate authorities.

Prohibited materials: None known.

Special spill response procedures: If a spill/release in excess of EPA reportable quantity is made into the environment, immediately notify the national response center (phone: 1-800-424-8002).

EPA/CERCLA Reportable quantity: Chlorpyrifos (RQ 1- lbs.)

SECTION 7 — HANDLING AND STORAGE

Safe handling procedures: This material is a toxic liquid. Wear full chemically protective equipment during handling. Use only in well ventilated area. Avoid all contact with eyes, skin and clothing. Do not inhale vapors or mists. Keep away from all unprotected persons and children.

This product is flammable. Formation of explosive vapour-air mixtures is possible. Fire prevention measures should be taken. Keep away from sources of ignition and protect from exposure to fire and heat. Take precautions against static discharge. Do not use near sources of heat, flame or direct sunlight. BOLTON™ insecticide should never be heated above 131°F / 55°C and also local heating above this temperature should be avoided. Keep away from alkalis and incompatibles. Use caution when opening containers. Keep container tightly closed when not in use. Wash thoroughly after handling.

Storage recommendations: Store in a cool, dry, well ventilated area away from incompatibles. Store in tightly closed and labelled containers. Product should be stored at temperatures not exceeding 100°F for any extended time. Protect container from physical damage. No smoking in the area. Inspect containers periodically for damage or leaks.

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 controls: If handled indoors, provide mechanical exhaust ventilation to keep concentrations below specified TLV's and PEL's.

Respiratory protection: Respiratory protection is required. Wear a pesticide respirator jointly approved by the MSHA and NIOSH. Advice should be sought from respiratory protection specialists.

Protective gloves: Wear impervious chemical-resistant gloves, such as barrier laminate, butyl rubber or nitrile rubber. Advice should be sought from glove suppliers on the proper selection of gloves.

Eye protection: Wear face mask rather than goggles or safety glasses. The possibility of eye contact should be excluded.

Other protective equipment: Wear appropriate protective clothing to prevent skin contact, such as coveralls or long sleeved shirt, long pants, and shoes and socks. Other protective equipment, such as an eyewash station and safety shower, may be required depending on exposure and on workplace standards.

Permissible exposure levels: See Section 2.

General hygiene considerations: Do not breathe vapors or mists. Avoid contact all contact with eyes, skin and clothing. Before removing gloves, wash them with soap and water. Always wash hands, face and arms with soap and water before smoking, eating or drinking. After work, take off all protective equipment, work clothes and shoes, and wash with soap and water. Respirator should be cleaned and filter replaced according to manufacturer's instructions. Wear only clean, uncontaminated clothes when leaving place of work. Persons working with this product for a longer period should have frequent blood tests for cholinesterase levels. If the cholinesterase levels fall below a critical point, no further exposure should be allowed until it has been determined, by means of blood tests, that cholinesterase levels have returned to normal.

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

Physical state, odor and appearance: Yellow liquid, aromatic odor.

Date: March 1, 2012

Odor threshold: N/Av**Specific gravity (water = 1):** N/Av**Solubility (chlorpyrifos):** 0.94 mg/L in water @ 25° C**pH:** 5.11**Density:** 1.01 g/ml @ 20° C**Melting/freezing point:** 37.1°F / 2.85°C. (technical material)**Boiling point:** not determined**Vapour pressure:** not determined**Viscosity:** not determined**Surface tension:** not determined**Vapour density (Air=1.0):** N/Av**Percent Volatile by Weight:** N/Av**Evaporation rate (n-BuAc=1.0):** N/Av**Coefficient of n-Octanol/water distribution:** not determined

SECTION 10 — REACTIVITY AND STABILITY DATA

Stability and reactivity: Stable if handled below 131°F / 55°C. At higher temperatures decomposition may take place, and the released heat from decomposition can raise the temperature further and accelerate decomposition. Chlorpyrifos can corrode iron, steel, tin plate and copper. It can be rapidly hydrolysed at pH >7.

Hazardous polymerization: Above 284°F / 140°C Chlorpyrifos may decompose rapidly, significantly increasing the risk of inducing explosions. Direct local heating such as electric heating or by steam must be avoided. The decomposition is to a considerable extent dependant on time as well as temperature due to self-accelerating exothermic and autocatalytic reactions. The reactions involve rearrangements and polymerisation releasing volatile, malodorous and inflammable compounds such as dimethyl sulfide.

Conditions to avoid: Avoid heat, flame, spark and direct sunlight.

Materials to avoid (incompatibles): Strong alkalis, amines and strong oxidizing compounds. The product can corrode iron, steel, tin plate and copper. Chlorpyrifos is rapidly hydrolysed at pH > 7.0.

SECTION 11 — TOXICOLOGICAL INFORMATION

Routes of exposure: Skin contact, skin absorption, eye contact, inhalation, and ingestion.

Toxicological data (based on results from the technical material):

LD₅₀, oral, rat (mg/kg) = 300-800

LD₅₀, dermal, rabbit (mg/kg) = >2000

LC₅₀, inhalation, rat (mg/L/4-hr) = 1-5

Carcinogenicity: Chlorpyrifos is not classified as carcinogenic by IARC, ACGIH, OSHA or NTP.

Teratogenicity, mutagenicity, other reproductive effects: None observed in test animals.

Sensitization to material: None known.

Synergistic materials: Not available.

Conditions aggravated by exposure: Repeated exposures to cholinesterase inhibitors, such as Chlorpyrifos, may without warning cause increased susceptibility to doses of any cholinesterase inhibitor.

SECTION 12 — ECOLOGICAL INFORMATION

Chemical fate information: The active ingredient, Chlorpyrifos, is readily biodegradable. It undergoes rapid degradation in the environment and, without problems, in sewage treatment plants. No adverse effects are observed at concentrations up to 100 mg/L in waste water treatment plants. Degradation occurs both aerobically and anaerobically, and biologically as well as abiotically. Under normal conditions, Chlorpyrifos is of medium mobility in soil, but is degraded rapidly. The product should not be allowed to enter drains or water courses or be deposited where it can affect ground or surface waters. Do not discharge product unmonitored into the environment.

Environmental hazards: This product is extremely toxic to fish, aquatic invertebrates and insects. It may be harmful to birds. It is not considered as harmful to aquatic plants and micro- and macroorganisms. Do not apply directly to water or to areas where surface water is present or to intertidal areas below the mean high water mark. Runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water by cleaning equipment or disposal of wastes.

SECTION 12 — ECOLOGICAL INFORMATION CONTINUED

Ecotoxicological information: The ecotoxicity measured of the active ingredient is:

		Chlorpyrifos	Gamma-cyhalothrin
Fish	Zebrafish (<i>Danio rerio</i>) 96-h LC ₅₀	3 µg/l	0.07 µg/l
Invertebrates	Daphnids (<i>Daphnia magna</i>) 48-h LC ₅₀	1.7 µg/l	0.1 µg/l
	21-day NOEC	0.056 µg/l	0.0022 µg/l
Algae	Green algae (<i>Selenastrum subspicatus</i>) 96-h IC ₅₀	0.48 mg/l	
	Green algae (<i>Selenastrum capricornutum</i>) 72-h IC ₅₀		>2.85 mg/l
Birds	Bobwhite quail (<i>Colinus virginianus</i>) LD ₅₀	13.3 mg/kg	>2000 mg/kg
	Mallard duck (<i>Anas platyrhynchos</i>) LD ₅₀	75.6 mg/kg	
Insects	Honey bees (<i>Apis mellifera</i>) LD ₅₀ , oral	0.36 µg/bee	4.2 µg/bee
	LD ₅₀ , contact	0.070 µg/bee	0.005 µg/bee

SECTION 13 — DISPOSAL CONSIDERATIONS

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

Methods of disposal: Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Triple rinse (or equivalent) containers, then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill. Disposal must be in accordance with all applicable federal, state and local regulations. Contact your local, state or federal environmental agency for specific rules.

SECTION 14 — TRANSPORTATION INFORMATION

US DOT 49 CFR information:

For **non-bulk** shipments:

UN2903, Pesticides, liquid, toxic, flammable, n.o.s. (chlorpyrifos, aromatic hydrocarbons), 6.1(3), PGIII, RQ

For **bulk** shipments by all modes of transportation:

UN2903, Pesticides, liquid, toxic, flammable, n.o.s. (chlorpyrifos, aromatic hydrocarbons), 6.1(3), PGIII, RQ, Marine Pollutant

INTERNATIONAL:

IMDG/IMO (vessel): UN2903, Pesticides, liquid, toxic, flammable, n.o.s. (chlorpyrifos, aromatic hydrocarbons), 6.1(3), PGIII, RQ, Marine Pollutant

IATA/ICAO (air): UN2903, Pesticides, liquid, toxic, flammable, n.o.s. (chlorpyrifos, aromatic hydrocarbons), 6.1(3), PGIII, RQ, Marine Pollutant

SECTION 15 — REGULATORY INFORMATION

Regulations under FIFRA: All pesticides are governed under FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act). Therefore, the regulations presented are pertinent only when handled outside of the normal use and applications of pesticides. This includes waste streams resulting from manufacturing/formulating facilities, spills or misuse of products, and storage of large quantities of products containing hazardous or extremely hazardous substances.

EPA/CERCLA Reportable Quantity (RQ): Chlorpyrifos 1-lbs

SARA TITLE III:

Sec. 302, Extremely Hazardous Substance Notification: This material is not known to contain any Extremely Hazardous Substances.

Sec. 311/312, Hazard Categories: Immediate (acute) health hazard
Chronic (delayed) health hazard
Fire hazard

Sec. 313, Toxic Chemicals Notification: 1,2,4-Trimethylbenzene (CAS #: 95-63-6) 22%
Cumene (CAS#: 98-82-8) 3%

California Proposition 65: This product contains cumene which is known to the state of California to cause cancer.

SECTION 16 — OTHER INFORMATION

HMIS Rating: 2 Health; 2 Flammability; 1 Reactivity
NFPA Rating: 2 Health; 2 Flammability; 1 Reactivity

SECTION 16 — OTHER INFORMATION CONTINUED

Legend: ACGIH – American Conference of Governmental Industrial Hygienists
CAS - Chemical Abstract Service
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR – Code of Federal Regulations
EPA – Environmental Protection Agency

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BOLTON is a trademark of Cheminova.