

MATERIAL SAFETY DATA SHEET

SECTION 1 — PRODUCT AND COMPANY IDENTIFICATION

Product identifier: ZORO™ MITICIDE / INSECTICIDE

Product use: Insecticide for controlling a broad range of pests on crops.

Supplier's name and address:

Cheminova Inc.

One Park Drive, Suite 150
Research Triangle Park, NC USA
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)

Manufacturer's name and address:

Cheminova A/S.
P.O. Box 9
DK-7620 Lemvig
Denmark

MSDS Prepared by: Cheminova Inc.

MSDS Preparation date: November 22, 2006

MSDS Revision date: December 23, 2009

SECTION 2 — COMPOSITION/INFORMATION ON INGREDIENTS

<u>Ingredients</u>	<u>CAS #</u>	<u>% (weight)</u>	<u>ACGIH TLV</u>	<u>OSHA PEL</u>
Abamectin	71751-41-2	1 - 5	N/Av	N/Av
n-Methyl-2-pyrrolidone	872-50-4	15 - 40	*10 ppm (skin)	N/Av
1-Hexanol	111-27-3	15 - 40	N/Av	N/Av
Calcium dodecylbenzene sulfonate	26264-06-2	1 - 3	N/Av	N/Av
2,6-Di-tert-butyl-p-cresol	128-37-0	0.5 - 1.5	2 mg/m ³	*10 mg/m ³

*Note: The ACGIH TLV listed above for n-Methyl-2-pyrrolidone is an AIHA WEEL. The OSHA PEL listed above for 2,6-Di-tert-butyl-p-cresol is a final rule / vacated value.

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

SECTION 3 — HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Pale yellow liquid. Slightly soap-like amine odor.

Warning! Combustible liquid and vapor. Poison. May be fatal if swallowed in large amounts. Causes eye irritation. May cause skin and respiratory irritation. May be dangerous for the environment. This product is highly toxic to aquatic invertebrates, toxic to fish and harmful to aquatic plants and earthworms.

POTENTIAL HEALTH EFFECTS

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

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

Inhalation: Inhalation causes nasal and respiratory tract irritation. May cause dizziness, drowsiness, nausea, headache and other symptoms of central nervous system depression.

Skin contact: Direct skin contact may cause mild to moderate irritation.

Eye contact: Direct eye contact may cause moderate to severe irritation and injury.

Ingestion: May be fatal if swallowed in large amounts. May cause dizziness, drowsiness, nausea, headache, hypotension, vomiting, convulsions, tremors, coma and other symptoms of central nervous system depression. Could eventually cause death as a result of respiratory failure.

Effects of long-term (chronic) exposure: Repeated or prolonged skin exposure may result in drying, cracking and defatting of the skin (dermatitis).

Carcinogenicity: See TOXICOLOGICAL INFORMATION (Section 11).

Other important hazards: See TOXICOLOGICAL INFORMATION (Section 11).

Potential environmental effects: This product is highly toxic to aquatic invertebrates, toxic to fish and harmful to aquatic plants and earthworms. See ECOLOGICAL INFORMATION (Section 12).

SECTION 4 — FIRST AID MEASURES

Inhalation: Immediately remove victim to fresh air. If breathing has stopped, begin artificial respiration immediately. Obtain medical attention immediately if symptoms develop and persist.

Skin: Immediately wash skin with mild soap and running water, while removing contaminated clothing and shoes. Obtain medical attention if irritation develops and persists. Thoroughly clean contaminated clothing before re-use.

Eyes: Immediately flush eyes with running water for at least 20 minutes. Obtain medical attention immediately.

Ingestion: If ingested, obtain medical attention immediately. Do not induce vomiting without the advice of qualified medical personnel. Have victim rinse mouth with water, then give one to two glasses of water to drink. Never give anything by mouth if victim is unconscious or convulsing.

Note to physician: There is no specific antidote for this product. Treat symptomatically.

SECTION 5 — FIRE FIGHTING MEASURES

Fire hazards/conditions of flammability: Combustible liquid and vapor. Product will ignite when exposed to extreme heat and flame. Material may decompose when exposed to heat and flame. Closed containers are contained under pressure and will explode if exposed to excess heat or flame.

Flammability classification (OSHA 29 CFR 1910.1200): Class IIIA Combustible liquid.

Flash point (Method): 158°F (70°C) (Pensky-Martens Closed Cup)

Flammable limits (% by volume): 1.3 – 9.5 (n-Methyl-2-pyrrolidone); 1.2 – 7.7 (1-Hexanol).

Explosion data: *Sensitivity to mechanical impact:* Not sensitive.

Sensitivity to static discharge: Not expected to be sensitive.

Auto-ignition temperature: 473°F / 245°C (n-Methyl-2-pyrrolidone); 545°F / 285°C (1-Hexanol).

Suitable extinguishing media: For small fires, use dry chemical or carbon dioxide. For large fires, use water spray or foam. Do not use water jet, as this may spread the fire.

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.

Hazardous combustion products: Carbon oxides, nitrogen oxides, aldehydes and other irritating fumes and smoke.

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 chemically protective equipment. Refer to Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION, for additional information on acceptable protective equipment.

Environmental precautions: Ensure spilled product does not enter drains, sewers, waterways, or confined spaces. Dike area to prevent entry into the environment.

Spill response/Cleanup: Eliminate all sources of heat, sparks and flame. Ventilate area of release. Stop leak if you can do so without risk. Absorb spilled material with inert, non-combustible absorbent material, such as universal binder, Fuller's earth or other absorbent clays and place into suitable, labelled containers for later disposal (see Section 13). Rinse spill area with large amounts of water and detergent. Absorb contaminated wash material with inert, non-combustible absorbent material, such as universal binder, Fuller's earth or other absorbent clays and place into suitable, labelled containers for later disposal (see Section 13). Do not allow wash material to enter drains, sewers or waterways. 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. 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 in the United States, immediately notify the national response center (phone: 1-800-424-8002).

EPA/CERCLA Reportable quantity: Calcium dodecylbenzene sulfonate (1000 lbs / 454 kg).

SECTION 7 — HANDLING AND STORAGE

Safe handling procedures: This material is a combustible, harmful liquid. Follow all additional recommended guidelines on the labeling of this product. Wear full chemically protective equipment during handling. Use only in well ventilated area. Avoid all contact with eyes, skin and clothing. Avoid breathing vapors or mists. Do not ingest. Keep away from all unprotected persons and children. Do not use near sources of heat, flame or ignition sources. Keep away from bases and incompatibles. Use caution when opening containers. Keep container tightly closed when not in use. Wash thoroughly after handling.

SECTION 7 — HANDLING AND STORAGE Continued

Storage recommendations: Store in a cool (< 95°F / 35°C), dry, well ventilated area away from sources of heat, ignition and sunlight. Keep away from incompatibles. Inspect containers periodically for damage or leaks. No smoking in the area.

Storage area should be clearly identified, clear of obstruction and accessible only to trained and authorized personnel.

Special packaging materials: Always keep in containers made of the same materials as the supply container.

SECTION 8 — EXPOSURE CONTROLS AND PERSONAL PROTECTION

Permissible exposure levels: See Section 2.

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 if airborne concentrations exceed permissible exposure levels.

Wear respirators with particle filters, which are jointly approved by the MSHA and NIOSH. Advice should be sought from respiratory protection specialists.

Protective gloves: Wear impervious chemical gloves, such as barrier laminate, butyl rubber or nitrile rubber. Small tears in the gloves and cross-contamination can easily occur. Change gloves frequently and limit manual work. Advice should be sought from glove suppliers.

Eye protection: Wear chemical splash goggles.

Other protective equipment: Wear coveralls, or long sleeved shirt and pants, to prevent skin contact. An eyewash station and safety shower should be made available in the immediate working area. Other protective equipment may be required depending on exposure and on workplace standards.

General hygiene considerations: Avoid inhaling 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.

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

Physical state, odor and appearance: Pale yellow liquid. Slightly soap-like amine odor.

Odor threshold: N/Av

Specific gravity (water = 1): 0.961 @ 68°F / 20°C

pH: 6.5 @ 68°F / 20°C (for 1% emulsion in water).

Boiling point: Decomposes: 395.6°F / 202°C (n-Methyl-2-pyrrolidone); 314.6°F / 157°C (1-Hexanol).

Melting/freezing point: N/Av.

Vapour density (Air=1.0): N/Av

Percent Volatile by Weight: N/Av

Evaporation rate (n-BuAc=1.0): N/Av

Viscosity: ~ 20 cP @ 68°F / 20°C (1% emulsion in water)

Vapour pressure: Abamectin: 1.5×10^{-9} mmHg @ 68°F / 20°C

n-Methyl-2-pyrrolidone: 0.3 mmHg @ 68°F / 20°C

1-Hexanol: 0.7 mmHg @ 68°F / 20°C

Coefficient of n-Octanol/water distribution: Abamectin: $\log K_{ow} = 2.0$.

Solubility in water: This product is miscible in water.

Abamectin: 0.54 mg/L @ 68°F / 20°C

Solubility in organic solvents: Abamectin:

139 oz / gal (1038 g/L) @ 68°F / 20°C (Acetone)

20.4 oz / gal (153 g/L) @ 68°F / 20°C (Methanol)

SECTION 10 — REACTIVITY AND STABILITY DATA

Stability and reactivity: Stable under the recommended storage and handling conditions prescribed. When exposed to air, product may slowly release hydroperoxides. This process may be accelerated by sunlight.

Hazardous polymerization: Will not occur.

Conditions to avoid: Avoid heat, flame and other sources of ignition.

Materials to avoid (incompatibles): Strong oxidizing agents, acids, bases, halogens, alkali metals.

Hazardous decomposition products: None known. Refer to 'Hazardous combustion products', Section 5.

SECTION 11 — TOXICOLOGICAL INFORMATION

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

Toxicological data: LC₅₀ (mg/L/4 hrs) = > 3.87* (maximum obtainable concentration – signs of toxicity at this concentration)

LD₅₀, oral, rat (mg/kg) = 250*

LD₅₀, dermal, rat (mg/kg) = > 4000*

(* estimated values based on measurements on a similar product).

Carcinogenicity: None of the ingredients in this product are classified as carcinogenic by IARC, ACGIH, OSHA or NTP.

Teratogenicity, mutagenicity, other reproductive effects: This product contains n-Methyl-2-pyrrolidone. n-Methyl-2-pyrrolidone has shown embryotoxic effects, based on animal data. Effects were observed only at doses which were also toxic to the mother, or by routes of administration not expected occupationally (injection).

Sensitization to material: Not known to cause allergic respiratory or skin sensitization reactions.

Synergistic materials: Not available.

Conditions aggravated by exposure: Pre-existing skin, eye or respiratory disorders.

SECTION 12 — ECOLOGICAL INFORMATION

Ecotoxicological information: 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 insecticide. The active ingredient, Abamectin, is highly toxic to aquatic invertebrates, toxic to fish and harmful to aquatic plants and earthworms. It is not considered as harmful to birds or soil microorganisms. The acute toxicity of Abamectin is measured to be:

Fish – 96-Hr LC₅₀, Mirror carp (*Cyprinus carpio*) = 3.28 mg/L.

Birds – LD₅₀, Japanese quail (*Coturnix coturnix japonica*) = > 2000 mg/kg.

Bees - 48-Hr LD₅₀, Bees = 4.2 µg/bee.

Mobility: The active ingredient, Abamectin, is mobile in soil.

Persistence and degradability: The active ingredient in this product, Abamectin, is not readily biodegradable. Degradation half-lives vary with circumstances and have been found to vary from 14 to 20 days in different soil types. The active ingredient, Abamectin, is also degraded photochemically in soil and water.

Bioaccumulative potential: The active ingredient, Abamectin, is not considered to have a bioaccumulative potential. The bioconcentration (BCF) factor was measured to be 54 in zebrafish (*Danio rerio*; whole fish).

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. 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 unsuitable for further use by puncturing. Dispose of in compliance with all Federal, State, Provincial and local regulations.

RCRA: If this product, as supplied, becomes a waste, 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

US 49 CFR information:

Proper Shipping Name: Pesticides, liquid, toxic, n.o.s. (Abamectin)

Primary Hazard Class: 6.1.

Label Codes: 6.1.

Identification Number: UN2902

Packing Group: III.

Reportable Quantity: 1000 lbs. (Calcium dodecylbenzene sulfonate).

Marine Pollutant: Yes (P).

Special Transportation Notes: For shipments by ground for the United States, the Limited Quantity exception may apply. Under the US 49 CFR, refer to Section 173.153 for additional exception information, if shipping under this exception.

SECTION 14 — TRANSPORTATION INFORMATION Continued

Canadian Transportation of Dangerous Goods Regulations (TDGR) shipping information:

Proper Shipping Name: PESTICIDE, LIQUID, TOXIC, N.O.S. (Abamectin)

UN No.: UN 2902

Primary Class(es): 6.1

Subsidiary Class(es): None

Packing Group: III

Other Shipping Information: This product may be shipped by ground within Canada, as a 'Limited Quantity'. Refer to Section 1.17 for Limited Quantity Information, if shipping under this exemption.

SECTION 15 — REGULATORY INFORMATION

Canada:

WHMIS information: This product is a Pest Control Product and is not regulated as a Controlled Product under the Hazardous Products Act (HPA). However, for reference purposes only, this product would have the following WHMIS Classification if it were regulated as a Controlled Product under the HPA: **Class B3** (*Combustible Liquids*); **Class D1B** (*Materials causing immediate and serious toxic effects, Toxic Material*), **Class D2B** (*Materials causing other toxic effects, Toxic Material*).

US Federal Information:

EPA/CERCLA Reportable Quantity (RQ): None reported.

SARA TITLE III:

Sec. 302, Extremely Hazardous Substances, 40 CFR 355: No Extremely Hazardous Substances are present.

Sec. 313, Toxic Chemicals Notification, 40 CFR 372: This material may be subject to SARA notification requirements, since it contains Abamectin and n-Methyl-2-pyrrolidone, Toxic Chemical constituents above their *de minimus* concentrations.

US State Right to Know Laws:

California Proposition 65 information: This product contains n-Methyl-2-pyrrolidone. n-Methyl-2-pyrrolidone is known to the State of California to cause developmental harm.

SECTION 16 — OTHER INFORMATION

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

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
HMIS - Hazardous Materials Identification System
IARC – International Agency for Research on Cancer
Inh – Inhalation
MSHA – Mine Safety and Health Administration
N/Ap – Not Applicable
N/Av – Not Available
NIOSH – National Institute for Occupational Safety and Health
NTP – National Toxicology Program
OSHA – Occupational Safety and Health Act
PEL - Permissible Exposure Limit
PMRA – Canadian Pest Management Regulatory Agency
RCRA – Resource Conservation and Recovery Act
SARA - Superfund Amendments & Reauthorization Act
TLV – Threshold Limit Value
TSCA – Toxic Substances Control Act
WHMIS – Workplace Hazardous Materials Information System

Preparation Date: December 23, 2009

SECTION 16 — OTHER INFORMATION Continued

- References:**
1. ACGIH, Threshold Limit Values and Biological Exposure Indices for 2006.
 2. Canadian Centre for Occupational Health and Safety, CCIInfoWeb databases, 2006 (Chempendium and RTECs).
 3. Material Safety Data Sheet from manufacturer.
 4. International Agency for Research on Cancer Monographs, searched 2006.
 5. US EPA Title III List of Lists – January 27, 2005 version.
 6. California Proposition 65 List – February 3, 2006 version.

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