

BINZ LIFE SCIENCE

MATERIAL SAFETY DATA SHEET (MSDS)

Product Name:	BOREGUARD	Formulation:	Chlorpyrifos 40% EC
Document No:	BLS-MSDS-INS-040	Effective Date:	July 2026 (Rev. 04)

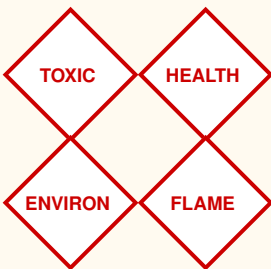
1. PRODUCT AND COMPANY IDENTIFICATION

Product Identifier:	BOREGUARD Insecticide
Brand Name:	Binz Life Science
Active Ingredient:	Chlorpyrifos (400 g/L EC)
Chemical Class:	Organophosphate Insecticide
CAS Registry Number:	2921-88-2 (Chlorpyrifos active ingredient)
Recommended Use:	Broad-spectrum agricultural insecticide for controlling soil-dwelling, chewing, and sucking pests in cotton, rice, sugarcane, corn, vegetables, and fruit orchards.
Manufacturer / Distributor:	Binz Life Science Co., Ltd. Industrial Zone, Sector 4, Agrochemical Complex Emergency Hotline / Technical Support: +1-800-555-BINZ (24 Hours) Email: regulatory@binzlifescience.com Web: www.binzlifescience.com

2. HAZARDS IDENTIFICATION

GHS Classification of the Chemical:

- **Acute Toxicity, Oral:** Category 3 (H301)
- **Acute Toxicity, Dermal:** Category 4 (H312)
- **Acute Toxicity, Inhalation:** Category 4 (H332)
- **Skin Corrosion/Irritation:** Category 2 (H315)
- **Serious Eye Damage/Eye Irritation:** Category 2A (H319)
- **Aspiration Hazard:** Category 1 (H304)
- **Specific Target Organ Toxicity (Single Exposure):** Category 3 - Narcotic effects, Respiratory tract irritation (H335, H336)
- **Specific Target Organ Toxicity (Repeated Exposure):** Category 1 - Nervous System / Cholinesterase Inhibition (H372)
- **Flammable Liquids:** Category 3 (H226)
- **Hazardous to the Aquatic Environment, Acute Hazard:** Category 1 (H400)
- **Hazardous to the Aquatic Environment, Long-term Hazard:** Category 1 (H410)



SIGNAL WORD: DANGER

Hazard Statements:

- H301: Toxic if swallowed.
- H304: May be fatal if swallowed and enters airways.
- H312 + H332: Harmful in contact with skin or if inhaled.
- H315: Causes skin irritation.
- H319: Causes serious eye irritation.

- H335 + H336: May cause respiratory irritation. May cause drowsiness or dizziness.
- H372: Causes damage to organs (Central Nervous System, Cholinesterase) through prolonged or repeated exposure.
- H226: Flammable liquid and vapour.
- H410: Very toxic to aquatic life with long lasting effects.

Precautionary Statements:

Prevention: P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P260: Do not breathe dust/fume/gas/mist/vapours/spray. P264: Wash thoroughly after handling. P270: Do not eat, drink or smoke when using this product. P271: Use only outdoors or in a well-ventilated area. P273: Avoid release to the environment. P280: Wear protective gloves/clothing/eye protection/face protection.

Response: P301+P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Do NOT induce vomiting. P302+P352: IF ON SKIN: Wash with plenty of soap and water. P304+P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing. P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing. P314: Get medical advice/attention if you feel unwell. P391: Collect spillage.

3. COMPOSITION / INFORMATION ON INGREDIENTS

This product is a formulation containing Chlorpyrifos as the active ingredient combined with aromatic solvent emulsifiers and stabilizing additives.

Chemical / Common Name	CAS Registry No.	Function / Purpose	Concentration (% w/w)
Chlorpyrifos <i>O,O-diethyl O-3,5,6-trichloro-2-pyridyl phosphorothioate</i>	2921-88-2	Active Ingredient (Insecticide)	40.0% w/w (400 g/L)
Solvent Naphtha (Petroleum) / Aromatic Hydrocarbons	64742-94-5	Carrier / Solvent	45.0% - 50.0%
Calcium Dodecylbenzene Sulfonate (Emulsifier)	26264-06-2	Surfactant / Emulsifier	3.0% - 6.0%
Ethoxylated Polyarylphenol	99734-09-5	Emulsifier / Dispersant	2.0% - 4.0%
Proprietary Inert Balance	Confidential	Stabilizer / Impurities	Balance to 100%

4. FIRST AID MEASURES

ORGANOPHOSPHATE POISONING ALERT: Chlorpyrifos is a cholinesterase inhibitor. Symptoms of acute cholinesterase inhibition include headache, dizziness, blurred vision, excessive salivation, sweating, nausea, vomiting, abdominal cramps, diarrhea, chest tightness, pinpoint pupils (miosis), muscle twitching, convulsions, and respiratory distress.

General Advice:	Remove victim from contaminated area immediately. Take off contaminated clothing. If person is unconscious or experiencing convulsions, do not give anything by mouth and place in recovery position. Have product container or label when seeking medical treatment.
Inhalation:	Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible (ensure rescuer safety). Administer oxygen if breathing is difficult. Seek immediate medical attention.
Skin Contact:	

	Immediately remove all contaminated clothing and shoes. Rinse skin instantly with plenty of running water for 15–20 minutes. Wash thoroughly with soap and water. Call a poison control center or doctor for treatment advice.
Eye Contact:	Hold eye open and rinse slowly and gently with clean water for 15–20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Obtain urgent medical examination by an ophthalmologist.
Ingestion:	DO NOT INDUCE VOMITING due to aspiration hazard from aromatic petroleum solvents. Immediately call a Poison Control Center or doctor. Never give anything by mouth to an unconscious person. Do not leave victim unattended.

Antidote & Medical Treatment Notes for Physicians:

Antidote: Atropine sulfate is the specific antidote of choice. Administer atropine sulfate intravenously in doses of 2.0 to 4.0 mg (for adults) every 10 to 15 minutes until full atropinization occurs (flushed skin, dry mouth, dilated pupils, tachycardia). Maintain atropinization until recovery.

Cholinesterase Reactivator: Pralidoxime chloride (2-PAM) or Toxogonin may be administered as a cholinesterase reactivator in conjunction with atropine. Administer 1–2 g of 2-PAM in 100 mL saline intravenously over 15–30 minutes. 2-PAM is most effective if given within 24 hours of exposure.

Contraindications: Avoid morphine, aminophylline, phenothiazines, reserpine, succinylcholine, and petroleum distillates/tranquilizers. Because of hydrocarbon solvent content, chemical pneumonitis or pulmonary edema may result if aspirated during vomiting; gastric lavage should be performed only under endotracheal intubation.

5. FIRE FIGHTING MEASURES

Flammability Properties: Flammable liquid (Category 3). Flash Point: ~42°C (Closed Cup). Vapors may form explosive mixtures with air at elevated temperatures.

Suitable Extinguishing Media: Alcohol-resistant foam, dry chemical powder, carbon dioxide (CO₂), water spray or fog. For major fires, use water spray or alcohol foam.

Unsuitable Extinguishing Media: Solid water jet / high-pressure hose streams, as this may spread the burning liquid and contaminate the environment.

Specific Hazards Arising from Chemical: Combustible emulsion product containing organic solvents. During a fire, toxic, irritating, and corrosive gases may be generated by thermal decomposition or combustion, including hydrogen chloride (HCl), nitrogen oxides (NO_x), phosphorus oxides (PO_x), sulfur oxides (SO_x), and phosgene traces.

Special Protective Equipment for Firefighters: Firefighters must wear full protective clothing including self-contained breathing apparatus (SCBA) operated in positive pressure mode. Cool closed containers exposed to fire with water spray to prevent pressure buildup and explosion.

Environmental Precautions during Firefighting: Prevent fire extinguishing water, runoff, and contaminated spillage from entering drains, sewers, or watercourses. Dike fire control water for later proper disposal.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures: Keep unauthorized and unprotected personnel away. Eliminate all sources of ignition (no smoking, flares, sparks, or flames in immediate area). Ventilate closed spaces before entering. Wear full personal protective equipment (see Section 8). Avoid breathing vapors, mist, or gas. Avoid contact with skin, eyes, and clothing.

Environmental Precautions: BOREGUARD is extremely toxic to aquatic organisms, fish, and aquatic invertebrates. Prevent further leakage or spillage if safe to do so. Do not allow material to contaminate ground water, surface waterways, storm drains, or soil systems. Report spills to relevant environmental protection authorities immediately.

Methods and Materials for Containment and Cleaning Up:

- *Small Spills:* Absorb liquid spill with non-combustible absorbent material (e.g., sand, earth, diatomaceous earth, vermiculite). Transfer absorbed material into suitable, labeled chemical waste containers for disposal. Clean surface thoroughly with detergent and water to remove residual contamination.
- *Large Spills:* Stop leak if without risk. Construct protective dikes using soil or sandbags to prevent runoff. Pump liquid into secure recovery drums. Neutralize remaining residue with dilute alkaline solution (e.g., sodium hydroxide or washing soda) and absorb. Collect all contaminated wash waters for appropriate disposal.

7. HANDLING AND STORAGE

Precautions for Safe Handling:

- Handle in accordance with good industrial hygiene and safety practices. Avoid contact with skin, eyes, and clothing. Do not breathe spray mist or vapors.
- Use only in well-ventilated areas or outdoors. Equip handling areas with local exhaust ventilation.
- Keep away from heat, sparks, open flames, and hot surfaces. Take precautionary measures against static discharges. Ground containers when transferring material.
- Do not eat, drink, or smoke when handling or using this product. Wash hands, forearms, and face thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using the toilet.
- Remove contaminated protective equipment and clothing immediately before entering clean areas. Wash clothes separately before reuse.

Conditions for Safe Storage, Including Any Incompatibilities:

- Store in original, securely sealed containers with original labeling intact. Do not store in unlabelled or improvised containers.
- Keep stored in a cool, dry, well-ventilated, secure pesticide storage room locked away from children, unauthorized personnel, animals, food, drink, and animal feedstuffs.
- Storage temperature should ideally be between 0°C and 30°C. Protect from freezing and extreme heat/direct sunlight. Keep away from strong oxidizing agents, strong acids, and strong bases.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Limits:

Component / Chemical Name	OSHA PEL	ACGIH TLV	NIOSH REL
Chlorpyrifos (CAS 2921-88-2)	Not established	0.1 mg/m³ TWA (Inhalable fraction, Skin)	0.2 mg/m³ TWA (Skin), STEL: 0.6 mg/m³
Aromatic Solvent Naphtha (CAS 64742-94-5)	500 ppm (2000 mg/m³)	100 mg/m³ TWA	100 mg/m³ TWA

Engineering Controls: Maintain air concentrations below occupational exposure limits. Use explosion-proof local exhaust or general dilution ventilation when handling, mixing, or transferring this product. Ensure eyewash stations and safety emergency showers are close to the chemical handling area.

Personal Protective Equipment (PPE):

Eye/Face Protection:	Tightly fitting chemical safety goggles and full-face shield (ANSI Z87.1 approved) to prevent eye contact from splash or mist. Do not wear contact lenses when handling.
Hand / Skin Protection:	Wear chemical-resistant gloves made of nitrile rubber, neoprene, barrier laminate, or Viton (minimum thickness 0.4 mm). Wash gloves before removal. Wear long-sleeved shirt, long pants, chemical-resistant apron, and heavy-duty rubber boots.

Respiratory Protection:	When engineering controls are insufficient or when handling high concentrations/mists, wear a NIOSH/MSHA-approved organic vapor respirator with a P100 particulate filter. In confined space emergencies, use SCBA.
Biological Monitoring:	Baseline red blood cell (RBC) and plasma cholinesterase determinations are recommended for workers with regular exposure to organophosphates. Biological exposure indices (BEI): acetylcholinesterase activity in RBCs < 70% of individual baseline.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance / Physical State:	Clear liquid, free from suspended matter	Color:	Amber to yellowish-brown liquid
Odor:	Characteristic aromatic / mercaptan hydrocarbon odor	Odor Threshold:	Not determined
pH (1% aqueous emulsion):	5.0 – 7.5	Specific Gravity / Density:	1.07 – 1.09 g/cm ³ at 20°C
Melting / Freezing Point:	< 0°C	Boiling Point / Range:	175°C – 205°C (solvent component)
Flash Point:	42°C (Closed Cup)	Evaporation Rate:	Not determined
Flammability (solid/gas):	Not applicable (liquid)	Explosive Limits (LEL/UEL):	LEL: ~0.8%, UEL: ~7.0% (Solvent)
Vapor Pressure (Active Ingredient):	2.7×10^{-3} Pa at 25°C (Chlorpyrifos)	Vapor Density (Air = 1):	> 1.0 (heavier than air)
Solubility in Water:	Emulsifiable in water (~1.4 mg/L pure AI)	Partition Coefficient (n-octanol/water):	Log Kow = 4.7 (Chlorpyrifos AI)
Auto-ignition Temperature:	> 400°C	Decomposition Temperature:	> 160°C (thermal breakdown)
Viscosity:	3.5 – 5.0 cSt at 20°C	Explosive / Oxidizing Properties:	Non-explosive, Non-oxidizing

10. STABILITY AND REACTIVITY

Reactivity: Non-reactive under standard ambient processing and storage conditions.

Chemical Stability: Stable under recommended storage conditions for up to 2 years in original sealed container. Thermally unstable at temperatures above 160°C.

Possibility of Hazardous Reactions: Hazardous polymerization will not occur. Hydrolysis occurs readily under strong alkaline conditions.

Conditions to Avoid: Heat, direct sunlight, sparks, open flames, high storage temperatures (>40°C), moisture, and alkaline conditions.

Incompatible Materials: Strong bases (e.g., sodium hydroxide), strong oxidizing agents, strong acids, alkaline pesticides (e.g., Bordeaux mixture, lime sulfur), and copper-containing equipment.

Hazardous Decomposition Products: Thermal degradation yields toxic, irritant, and highly hazardous vapors, including hydrogen chloride, phosphorus oxides, sulfur oxides, nitrogen oxides, and chloropyridines.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity (Formulation Data / Calculated Values):

- **Oral Toxicity (Rat LD50):** ~135 – 300 mg/kg (Toxic if swallowed - Category 3)
- **Dermal Toxicity (Rabbit/Rat LD50):** > 1,250 – 2,000 mg/kg (Harmful in contact with skin - Category 4)
- **Inhalation Toxicity (Rat LC50, 4-hour):** ~2.2 mg/L air (Harmful if inhaled - Category 4)

Skin & Eye Irritation / Sensitization:

- **Skin Irritation:** Moderately irritating to rabbit skin (Category 2). Prolonged contact may cause defatting and dermatitis due to solvent components.
- **Eye Irritation:** Moderately to severely irritating to eyes (Category 2A). May cause redness, swelling, conjunctivitis, and transient corneal clouding.
- **Sensitization:** Not classified as a skin sensitizer based on guinea pig maximization testing (GPMT).

Subchronic and Chronic Toxicity: Chlorpyrifos is an organophosphate insecticide that inhibits acetylcholinesterase (AChE) in the central and peripheral nervous systems. Repeated exposure causes cumulative cholinesterase inhibition leading to cholinergic symptoms (headache, muscle twitching, tremors, respiratory depression, hyper-salivation).

Carcinogenicity & Mutagenicity:

- **Carcinogenicity:** Chlorpyrifos is not classified as carcinogenic by IARC, NTP, or OSHA (EPA Group E: Evidence of non-carcinogenicity for humans).
- **Mutagenicity / Genotoxicity:** Ames tests, chromosomal aberration assays, and micronucleus tests show no evidence of mutagenic or genotoxic potential.
- **Reproductive & Developmental Toxicity:** No primary reproductive or teratogenic effects observed at non-maternally toxic doses. Embryotoxicity occurs only at doses toxic to the mother.

12. ECOLOGICAL INFORMATION

Ecotoxicity Data (Active Ingredient - Chlorpyrifos):

Organism Group	Species Tested	Exposure / Toxicity Metric	Value / Rating
Fish Toxicity	Rainbow Trout (Oncorhynchus mykiss)	96-hr LC50	0.003 mg/L (Extremely Toxic)
Fish Toxicity	Bluegill Sunfish (Lepomis macrochirus)	96-hr LC50	0.010 mg/L (Extremely Toxic)
Aquatic Invertebrates	Daphnia magna (Water Flea)	48-hr EC50	0.0001 mg/L (Very Highly Toxic)
Algae / Aquatic Plants	Pseudokirchneriella subcapitata	72-hr EC50	1.2 mg/L (Toxic)
Honey Bees (Apis mellifera)	Apis mellifera (Contact & Oral)	48-hr LD50	0.06 µg/bee (Highly Toxic to Bees)
Avian Toxicity	Mallard Duck (Anas platyrhynchos)	Acute Oral LD50	490 mg/kg (Moderately Toxic)
Avian Toxicity	Bobwhite Quail (Colinus virginianus)	Acute Oral LD50	32 mg/kg (Highly Toxic)
Earthworms	Eisenia fetida	14-day LC50	210 mg/kg soil (Moderately Toxic)

Persistence and Degradability: Chlorpyrifos degrades in soil via microbial degradation and aerobic hydrolysis. Typical field soil half-life (DT50) ranges from 30 to 120 days depending on soil type, pH, moisture, and temperature. Photolysis on soil surfaces occurs rapidly.

Bioaccumulative Potential: High bioaccumulation potential in aquatic species based on log Kow = 4.7 and Bioconcentration Factor (BCF) values ranging from 100 to 2,000 in fish. However, rapid depuration occurs when exposure ceases.

Mobility in Soil: Strongly adsorbed to soil organic matter (Koc = 2,000 – 8,100 mL/g). Low potential for leaching into groundwater systems under normal agricultural usage conditions.

13. DISPOSAL CONSIDERATIONS

Product / Pesticide Waste Disposal: Do not contaminate water, food, or feed by storage or disposal. Pesticide wastes are toxic. Imperfect disposal of excess product, spray mixture, or rinsate is a violation of federal and local environmental laws. Wastes should be disposed of by incineration in a licensed high-temperature chemical incineration facility equipped with an afterburner and scrubber system in accordance with local, state, and national hazardous waste regulations.

Container Handling & Disposal:

- Non-refillable container. Do not reuse or refill empty chemical containers.
- **Triple Rinse Procedure:** Empty remaining contents into application equipment or spray tank. Fill container 1/4 full with water. Replace and tighten closures. Shake for 10 seconds. Pour rinsate into application equipment or store rinsate for later use or disposal. Repeat this procedure two more times.
- Puncture empty, rinsed container and dispose of in an approved sanitary landfill or by incineration if permitted by local authorities. Do not burn unless permitted by local regulations.

14. TRANSPORT INFORMATION

UN / NA Number:	UN 3017
Proper Shipping Name:	ORGANOPHOSPHORUS PESTICIDE, LIQUID, TOXIC, FLAMMABLE, FLASHPOINT NOT LESS THAN 23 DEGREES C (Chlorpyrifos formulation in aromatic hydrocarbon solvent)
Primary Hazard Class:	6.1 (Toxic Substance)
Subsidiary Hazard Class:	3 (Flammable Liquid)
Packing Group:	PG III
Marine Pollutant:	YES (Chlorpyrifos) — Marine Pollutant mark required for bulk and non-bulk sea shipments.
Special Transport Precautions:	Do not transport alongside foodstuffs, animal feedstuffs, human clothing, or passenger luggage. Transport in well-secured containers in upright position. Ensure transport driver is trained in emergency spill containment measures.

15. REGULATORY INFORMATION

Global Chemical Inventory Status:

- **US EPA TSCA:** Active ingredient chlorpyrifos is subject to FIFRA regulation and pesticide statutory frameworks.
- **EU REACH Status:** Chlorpyrifos active substance status in the EU is non-approved for plant protection products. Export/import subject to PIC regulations (Prior Informed Consent).
- **OSHA Hazard Communication Standard:** Classified as hazardous according to 29 CFR 1910.1200 (GHS Standard).
- **SARA Title III Section 302 Extremely Hazardous Substances:** Threshold Planning Quantity (TPQ) applies for chlorpyrifos storage exceeding 10,000 lbs.

- **SARA Title III Section 313 Toxic Release Inventory:** Chlorpyrifos (CAS 2921-88-2) is subject to reporting requirements.
- **California Proposition 65:** Chlorpyrifos is listed as a developmental toxicant. Warning required for exposure under California regulations.

16. OTHER INFORMATION / DISCLAIMER

NFPA 704 Health & Flammability Hazard Rating:

Health: 2 (Moderate)	Flammability: 2 (Moderate)	Instability: 0 (Stable)
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Key Abbreviations & Acronyms:

CAS: Chemical Abstracts Service | **GHS:** Globally Harmonized System of Classification and Labelling | **EC50:** Effective Concentration 50% | **LC50:** Lethal Concentration 50% | **LD50:** Lethal Dose 50% | **PEL:** Permissible Exposure Limit | **TLV:** Threshold Limit Value | **SCBA:** Self-Contained Breathing Apparatus | **2-PAM:** Pralidoxime Chloride | **AChE:** Acetylcholinesterase

DISCLAIMER & LIMITATION OF LIABILITY:

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*** END OF MATERIAL SAFETY DATA SHEET — BINZ LIFE SCIENCE — BOREGUARD (CHLORPYRIFOS 40% EC) ***