Chlorpyrifos-methyl

sc-239541

Material Safety Data Sheet

Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
Chlorpyrifos-methyl

STATEMENT OF HAZARDOUS NATURE
CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA


SUPPLIER
Santa Cruz Biotechnology, Inc.
2145 Delaware Avenue
Santa Cruz, California 95060
800.457.3801 or 831.457.3800
EMERGENCY:
ChemWatch
Within the US & Canada: 877-715-9305
Outside the US & Canada: +800 2436 2255
(1-800-CHEMCALL) or call +613 9573 3112

SYNONYMS
C7-H7-Cl3-N-O3-P-S, "phosphorothioic acid, O, O-dimethyl O-(3, 5, 6-trichloro-2-pyridyl) ester", chloropyriphos-methyl, "O, O-dimethyl O-(3, 5, 6-trichloro-2-pyridyl)phosphorothioate", "methyl chlorpyrifos", "methyl chloropyriphos", "Dowco 214", "Dursban methyl", "ENT 27520", M-3196, Noltran, NSC-60380, OMS-1155, Reldan, "Reldan 50 EC", Tumar, Zertell, "organophosphorus pesticide/ insecticide/ acaricide"

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

		Min	Max
Flammability:	1		
Toxicity:	2		
Body Contact:	2		
Reactivity:	1		
Chronic:	2		

Min/Nil=0
Low=1
Moderate=2
High=3
Extreme=4

CANADIAN WHMIS SYMBOLS


EMERGENCY OVERVIEW

RISK

May cause SENSITISATION by skin contact.
Harmful in contact with skin and if swallowed.
Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.
■ Thiophosphates (phosphothioate esters) do not generally produce the same degree of cholinesterase inhibition associated with other organophosphates. They may however react with a range of compounds to produce such inhibitors. Ingestion of large quantities may produce severe abdominal pains, thirst, acidaemia, difficult breathing, convulsions, collapse, shock and even death. Organophosphates may suppress the immune system in some animal species.
■ Symptoms of chlorpyrifos poisoning are cholinesterase inhibition, headache, fatigue, dizziness, blurred vision, weakness, nausea, cramps, diarrhea, chest discomfort, sweating, miosis, tearing, salivation, vomiting, cyanosis and muscle twitching. In advanced cases convulsions, coma, loss of reflexes, and loss of sphincter control may occur. [OHMTADS].
Workers exposed to a 0.5% chlorpyrifos emulsion in field trials for malaria control showed a measured decrease in plasma and red blood cell cholinesterase levels (5 of 7 workers showed more than a 50% decrease within two weeks of the start of the program).
Spray workers ingesting 0.03 mg chlorpyrifos/kg body weight/day for 3 weeks did not show a statistically significant plasma cholinesterase depression. Workers exposed to a 0.5% chlorpyrifos emulsion in field trials for malaria control showed a measured decrease in plasma and red
blood cell cholinesterase levels (5 of 7 workers showed more than a 50% decrease within two weeks of the start of the program).
Chlorpyrifos-oxon, an active metabolite of chlorpyrifos, is 10 to 20 times more active than the parent compound against acetylcholinesterase in producing delayed polyneuropathy. In humans the enzyme that deactivates oxon-metabolites (paraoxonase) is variable both in form and in amount.
Rabbit paraoxonase hydrolyses chlorpyrifos oxon at a high rate making rabbits chlorpyrifos resistant.
■ Ingestion may produce nausea, vomiting, depressed appetite, abdominal cramps,and diarrhea.

EYE

■ There is some evidence to suggest that this material can causeeye irritation and damage in some persons.
■ Direct eye contact can produce tears, eyelid twitches, pupil contraction, loss of focus, and blurred or dimmed vision. Dilation of the pupils occasionally occurs.

SKIN

■ Skin contact with the material may be harmful; systemic effects may resultfollowing absorption.
■ The material is not thought to be a skin irritant (as classified using animal models). Abrasive damage however, may result from prolonged exposures.
■ Toxic effects of chlorpyrifos are dose related; as four repeated doses of 25 mg/kg (i.e. 1.75 gram/70 kg adult) each applied to the skin of human volunteers for 12 hours caused depression of plasma cholinesterase; four repeated doses of 10 mg/kg (i.e. 0.7 gram/ 70 kg adult) each did not show this effect.
■ Open cuts, abraded or irritated skin should not be exposed to this material.
■ Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.
■ There may be sweating and muscle twitches at site of contact. Reaction may bedelayed by hours.

INHALED

■ The material is not thought to produce respiratory irritation (as classified using animal models). Nevertheless inhalation of dusts, or fume, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.
■ Inhalation of vapors or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual.
■ Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.
■ Inhalation of aerosols containing chlorpyrifos has been shown to depress cholinesterase activity.
■ Poisoning due to cholinesterase inhibitors causes symptoms such as increased blood flow to the nose, watery discharge, chest discomfort, shortness of breath and wheezing. Other symptoms include increased production of tears, nausea and vomiting, diarrhea, stomach pain, involuntary passing of urine and stools, chest pain, breathing difficulty, low blood pressure, irregular heartbeat, loss of reflexes, twitching, visual disturbances, altered pupil size, convulsions, lung congestion, coma and heart failure.

CHRONIC HEALTH EFFECTS

■ Skin contact with the material is more likely to cause a sensitization reaction in some persons compared to the general population.
Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.
Exposure to the material may cause concerns for humans owing to possible developmental toxic effects, on the basis that similar materials tested in appropriate animal studies provide some suspicion of developmental toxicity in the absence of signs of marked maternal toxicity, or at around the same dose levels as other toxic effects but which are not a secondary non-specific consequence of other toxic effects.
Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung.
Prolonged skin contact may produce irritation and slight burns. Published literature and unpublished documents by the U.S. Environmental Protection Agency contain reports of congenital defects of test animals and in children exposed to Dursban (chloropyrifos). Birth defects of an extensive and unusual patterns were noted (1) in four children exposed, in utero, to Dursban. These included defects of the brain, eyes, ears, palate, teeth, heart, feet, nipples and genitalia. Brain defects were present in the ventricles, corpus callosum, choroid plexus, and septum pellucidum. Genital defects of the testes (undescended), micro phallus and labia (fused) were noted. All children had growth retardation, and three had hypotonia and profound mental retardation.

(1): Janette D. Sherman: Archives of Environmental Health, 51, 1, pp 5-8, 1996
Children are reported (2) to have developed narrowing of the peripheral visual fields, myopia, decreased acuity and retinal damage following in utero exposure to chlorpyrifos. The basis for these eye defects may be interference with the development of acetylcholine, a retinal neurotransmitter beginning in the pre-natal period. 3,5,6-trichloropyridinol (TCP) which is both a feed-stock of the product and a metabolic breakdown product of chlorpyrifos has been found to cause central nervous system anomalies (hydrocephaly and dilated brain ventricles) and multiple anomalies in the animal foetus, including cleft palate and skull and vertebral abnormalities. It is suggested that TCP contributes to the teratogenic effect of TCP. The reported half-life for TCP ranges between 27 hours and 66.5 to 127-9 hours.
(2): Janette D Sherman: International Journal of Occupational Medicine and Toxicology, 4, 4, pp 417-431.
Repeated or prolonged exposures to cholinesterase inhibitors produce symptoms similar to acute effects. In addition workers exposed repeatedly to these substances may exhibit impaired memory and loss of concentration, severe depression and acute psychosis, irritability, confusion, apathy, emotional liability, speech difficulties, headache, spatial disorientation, delayed reaction times, sleepwalking, drowsiness or insomnia.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
chlorpyrifos-methyl	5598-13-0	>98

Section 4 - FIRST AID MEASURES

SWALLOWED
■ If swallowed: · Contact a Poisons Information Center or a doctor at once. · If swallowed, activated charcoal may be advised.

EYE
■ If this product comes in contact with the eyes: · Wash out immediately with fresh running water. · Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.

SKIN
■ If product comes in contact with skin: · Contact a Poisons Information Center or a doctor. · DO NOT allow clothing wet with product to remain in contact with skin, strip all contaminated clothing including boots.

INHALED
· If spray mist, vapor are inhaled, remove from contaminated area. · Contact a Poisons Information Center or a doctor at once.

NOTES TO PHYSICIAN
■ for poisons (where specific treatment regime is absent):
----------BASIC TREATMENT

· Establish a patent airway with suction where necessary.
· Watch for signs of respiratory insufficiency and assist ventilation as necessary.
In rats, dogs and other mammals, following oral administration, the substance is rapidly metabolised with the major metabolite being 3,5,6-trichloro-2-pyridinol. Excretion is mainly in the urine.

Section 5 - FIRE FIGHTING MEASURES

Vapor Pressure (mmHg):	42.003 mPa (25 C)
Upper Explosive Limit (%):	Not available
Specific Gravity (water=1):	Not available
Lower Explosive Limit (%):	Not available

EXTINGUISHING MEDIA
· Foam.
· Dry chemical powder.

FIRE FIGHTING
· Alert Emergency Responders and tell them location and nature of hazard.
· Wear breathing apparatus plus protective gloves.
When any large container (including road and rail tankers) is involved in a fire,
consider evacuation by 100 metres in all directions.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS
· Combustible solid which burns but propagates flame with difficulty.
· Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
Combustion products include: carbon monoxide (CO), carbon dioxide (CO_2), hydrogen chloride, phosgene, nitrogen oxides (NOx), phosphorus oxides (POx), sulfur oxides (SOx), other pyrolysis products typical of burning organic material.

FIRE INCOMPATIBILITY
■ Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids,chlorine bleaches, pool chlorine etc. as ignition may result.

PERSONAL PROTECTION
Glasses:
Chemical goggles.

Gloves:
Respirator:
Particulate

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS
· Remove all ignition sources.
· Clean up all spills immediately.
· Avoid contact with skin and eyes.
· Control personal contact by using protective equipment.
· Use dry clean up procedures and avoid generating dust.
· Place in a suitable, labelled container for waste disposal.
Environmental hazard - contain spillage.
MAJOR SPILLS
■ Environmental hazard - contain spillage.
· DO NOT touch the spill material.
Moderate hazard.
· CAUTION: Advise personnel in area.
· Alert Emergency Responders and tell them location and nature of hazard.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING
· Avoid all personal contact, including inhalation.
· Wear protective clothing when risk of exposure occurs.
Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.
· Do NOT cut, drill, grind or weld such containers.
· In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

RECOMMENDED STORAGE METHODS
· Polyethylene or polypropylene container.
· Check all containers are clearly labelled and free from leaks.

STORAGE REQUIREMENTS
■ Observe manufacturer's storing and handling recommendations.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS
The following materials had no OELs on our records
• chlorpyrifos-methyl: CAS:5598-13-0

PERSONAL PROTECTION



RESPIRATOR
Particulate
Consult your EHS staff for recommendations

EYE
· Safety glasses with side shields.
· Chemical goggles.

HANDS/FEET
■ Wear chemical protective gloves, eg. PVC.
NOTE: The material may produce skin sensitization in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.
Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:
· frequency and duration of contact,
· chemical resistance of glove material,
· glove thickness and
· dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).
· When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
· When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
· Contaminated gloves should be replaced.
Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.
NOTE: Contaminated leather items, such as shoes, belts and watchbands should be removed and destroyed.

OTHER

· Overalls.
· P.V.C. apron.
· Barrier cream.
· Skin cleansing cream.
· Eye wash unit.

ENGINEERING CONTROLS

■ Concentrate material is measured and mixed, preferably outdoors, in proportions as recommended by manufacturer.
· Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
· Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Solid.
Does not mix with water.

State	Divided solid	Molecular Weight	322.5
Melting Range (°F)	113.5- 114.8.5	Viscosity	Not Applicable
Boiling Range (°F)	Not available	Solubility in water (g/L)	Immiscible
Flash Point (°F)	359.6 (COC)	pH (1% solution)	Not applicable.
Decomposition Temp (°F)	Not available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available	Vapor Pressure (mmHg)	42.003 mPa (25 C)
Upper Explosive Limit (%)	Not available	Specific Gravity (water=1)	Not available
Lower Explosive Limit (%)	Not available	Relative Vapor Density (air=1)	>1
Volatile Component (%vol)	Negligible	Evaporation Rate	Very Slow

APPEARANCE

Colourless, crystalline solid with slight mercaptan odour; does not mix well with water (4 mg/l, 24 C). Solubilities (g/kg, 24 C): acetone 6400, benzene 5200, diethyl ether 4800, chloroform 3500, methanol 300, hexane 230. Stable under neutral conditions but hydrolysed by acids (pH 4-6) and more readily, by alkalis (pH 8-10); DT50 3d (pH 8).

.log Kow 4.96-5.11

Material	Value

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

· Presence of incompatible materials.
· Product is considered stable.

STORAGE INCOMPATIBILITY

■ A number of phosphate and thiophosphate esters are of limited thermal stability and undergo highly exothermic self-accelerating decomposition reactions which may be catalyzed by impurities. The potential hazards can be reduced by appropriate thermal control measures.
· Avoid strong acids, bases.
· Alkyl esters of thiophosphates are often temperature sensitive and decompose if overheated. Thermal decomposition products include highly toxic and odiferous hydrogen sulfide and extremely odorous alkyl mercaptans. Both species can be detected at extremely low concentrations and vapors may travel long distances.
· Low temperature storage may produce crystallization from solution.
Avoid reaction with oxidizing agents.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

CHLORPYRIFOS-METHYL

TOXICITY AND IRRITATION
CHLORPYRIFOS-METHYL:
■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY	IRRITATION
Oral (rat) LD50: 1828 mg/kg	Skin (rabbit): 500 mg/24 h - Mild
Oral (rat) LD50: >3000 mg/kg *	Skin: non-irritating *
Inhalation (rat) LC50: >670 mg/m³/4h	Eyes: non-irritating *
Dermal (rat) LD50: 3713 mg/kg	
Dermal (rat) LD50: >3700 mg/kg *	
Subcutaneous (rat) LD50: 6900 mg/kg	
Intravenous (rat) LD50: 1710 mg/kg	
Oral (mouse) LD50: 2032 mg/kg	
Oral (mouse) LD50: 1100-2250 mg/kg *	
Dermal (mouse) LD50: >2800 mg/kg	
Intraperitoneal (mouse) LD50: 2325 mg/kg	
Subcutaneous (mouse) LD50: 23800 mg/kg	
Oral (rabbit) LD50: 2000 mg/kg	
Dermal (rabbit) LD50: 2000 mg/kg	
Dermal (rabbit) LD50: >2000 mg/kg	
Oral (g.pig) LD50: 2250 mg/kg	
Oral (chicken) LD50: >7950 mg/kg	
Oral (wild) bird: LD50 13 mg/kg	

■ [* The Pesticides Manual, Incorporating The Agrochemicals Handbook, 10th Edition, Editor Clive Tomlin, 1994, British Crop Protection Council].
NOEL (2 y) based on blood plasma cholinesterase activity, 0.1 mg/kg for dogs and rats. *
ADI 0.01 mg/kg b.w. *
Toxicity Class WHO Table 5;EPA III *
Lachrymation, tremors, diarrhoea recorded.

Section 12 - ECOLOGICAL INFORMATION

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
This material and its container must be disposed of as hazardous waste.
Avoid release to the environment.
Refer to special instructions/ safety data sheets.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
chlorpyrifos-methyl	HIGH		LOW	MED

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Instructions
All waste must be handled in accordance with local, state and federal regulations.
¦ Puncture containers to prevent re-use and bury at an authorized landfill.
Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.
A Hierarchy of Controls seems to be common - the user should investigate:
· Reduction
· Reuse
· Recycling
· Disposal (if all else fails)
This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.
DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.
· Recycle wherever possible.
· Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.

Section 14 - TRANSPORTATION INFORMATION

DOT:
Symbols: G Hazard class or Division: 9
Identification Numbers: UN3077 PG: III
Label Codes: 9 Special provisions: 8, 146,
335, B54,
IB8, IP3,
N20, T1,
TP33
Packaging: Exceptions: 155 Packaging: Non- bulk: 213
Packaging: Exceptions: 155 Quantity limitations: No limit
Passenger aircraft/rail:
Quantity Limitations: Cargo No limit Vessel stowage: Location: A
aircraft only:
Vessel stowage: Other: None
Hazardous materials descriptions and proper shipping names:
Environmentally hazardous substance, solid, n.o.s

Air Transport IATA:
ICAO/IATA Class: 9 ICAO/IATA Subrisk: None
UN/ID Number: 3077 Packing Group: III
Special provisions: A97
Cargo Only
Packing Instructions: 911 Maximum Qty/Pack: 400 kg
Passenger and Cargo Passenger and Cargo
Packing Instructions: 911 Maximum Qty/Pack: 400 kg
Passenger and Cargo Limited Quantity Passenger and Cargo Limited Quantity
Packing Instructions: Y911 Maximum Qty/Pack: 30 kg G
■ Air transport may be forbidden if this material is flammable, corrosive or toxic gases may be released under normal conditions of transport.
Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID,
N.O.S. *(CONTAINS CHLORPYRIFOS-METHYL)

Maritime Transport IMDG:
IMDG Class: 9 IMDG Subrisk: None
UN Number: 3077 Packing Group: III
EMS Number: F-A , S-F Special provisions: 179 274 335 909
Limited Quantities: 5 kg Marine Pollutant: Yes
Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.

Section 15 - REGULATORY INFORMATION

chlorpyrifos-methyl (CAS: 5598-13-0) is found on the following regulatory lists;
"OECD Representative List of High Production Volume (HPV) Chemicals","US EPCRA Section 313 Chemical List","US List of Lists - Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act"

Section 16 - OTHER INFORMATION

Reasonable care has been taken in the preparation of this information, but the author makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The author makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use. For additional technical information please call our toxicology department on +800 CHEMCALL.

■ Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.
A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Issue Date: Jun-22-2008
Print Date:Dec-29-2010