Dichlorvos

sc-207557

Material Safety Data Sheet

Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
Dichlorvos

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
C4-H7-Cl2-O4-P, "2, 2-dichloroethenyl dimethyl phosphate", dichlorovas, dichlorophos, "phosphoric acid, 2, 2-dichlorovinyl dimethyl ester", "ethenol, 2, 2-dichloro-, dimethyl phosphate", "dimethyl 2, 2-dichloroethenyl phosphate", "O, O-dimethyl O-2, 2-dichlorovinyl phosphate", "O, O-dimethyl dichlorovinyl phosphate", "2, 2-dichlorovinyl dimethyl phosphate", "dimethyl dichlorovinyl phosphate", DDVP, Apavap, Bibesol, "Atgard C", Fly-die, Bay-19149, "Bayer 19149", DDVF, Cypona, Dedevap, Brevinyl, Deriban, "Vapora II", "Brevinyl E50", UDFV, Benfos, Cekusan, Canogard, Devikol, NCI-C0013, Chlorvinphos, Mafu, Fecama, No-pest, Tetravos, Phosvit, Astrobot, Dichlorman, Task, Unifos, Equigel, "Atgard V", SD-1750, Krecalvin, Dichlorphos, Nuva, Duravos, Duo-kill, Mopari, Vaponite, Derribante, Oko, Herkol, Divipan, Estrosol, "OMS 14", Vinylphos, "Nuvan 100EC", Tenac, Herkal, Lindan, Equigard, "Task tabs", "No-pest strip", Nogos, Nerkol, Marvex, Estrosel, "Mafu strip", "Fly fighter", "Unifos 50"

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

		Min	Max
Flammability:	1		
Toxicity:	4		
Body Contact:	3		
Reactivity:	1		

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

Chronic: 3

CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW

RISK

Very toxic by inhalation.
May cause SENSITISATION by skin contact.
Toxic in contact with skin and if swallowed.
Very toxic to aquatic organisms.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ Toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual.
■ Severely toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 5 gram may be fatal or may produce serious damage to the health of the individual.
■ Limited evidence exists that the substance may cause irreversible but non-lethal mutagenic effects following a single exposure.
■ Ingestion may produce nausea, vomiting, depressed appetite, abdominal cramps,and diarrhea.
■ Symptoms may be nausea, headache, giddiness, blurred vision, contractionof pupils, vomiting.

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 produce toxic effects; systemic effectsmay result following absorption.
■ The material is not thought to be a skin irritant (as classified using animal models).
Temporary discomfort, however, may result from prolonged dermal exposures.
■ There may be sweating and muscle twitches at site of contact.
Reaction may bedelayed by hours.
■ 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.
■ Absorption by skin may readily exceed vapor inhalation exposure.
Symptoms for skin absorption are the same as for inhalation.

INHALED

■ Inhalation of aerosols (mists, fumes), generated by the material during the course of normal handling, may produce severely toxic effects.
Relatively small amounts absorbed from the lungs may prove fatal.
■ The material is not thought to produce respiratory irritation (as classified using animal models).
Nevertheless inhalation of vapors, fumes or aerosols, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.
■ 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.
■ Dichlorvos inhalation studies with animals have shown that it is difficult to achieve a lethal concentration in air because it is so readily absorbed on surfaces and hydrolysed by moisture.
■ Inhalation hazard is increased at higher temperatures.
■ Limited evidence exists that the substance may cause irreversible but non-lethal mutagenic effects following a single exposure.

CHRONIC HEALTH EFFECTS

■ Skin contact with the material is more likely to cause a sensitization reaction in some persons compared to the general population.
There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment.
Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.
There is some evidence that human exposure to the material may result in developmental toxicity. This evidence is based on animal studies where effects have been observed in the absence of marked maternal toxicity, or at around the same dose levels as other toxic effects but which are not secondary non-specific consequences of the other toxic effects.

Exposure to the material may result in a possible risk of irreversible effects. The material may produce mutagenic effects in man. This concern is raised, generally, on the basis of
appropriate studies with similar materials using mammalian somatic cells in vivo. Such findings are often supported by positive results from in vitro mutagenicity studies.
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.
In a dichlorvos gavage study, a statistically significant increase in forestomach squamous cell papillomas and two forestomach cell carcinomas were observed in female mice receiving 40 mg/kg/day. There was some evidence of carcinogenic activity in male mice as shown by an increased incidence of forestomach squamous cell papillomas. A dose-related increase in the incidence of mononuclear cell leukaemia was observed in male rats gavaged with 4 mg/kg/day.
BE AWARE: Repeated minor exposures with only mild symptoms may have serious cumulative poisoning effect.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
dichlorvos	62-73-7	> 90

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: · Immediately hold eyelids apart and flush the eye continuously with 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
· Most organophosphate compounds are rapidly well absorbed from the skin, conjunctiva, gastro-intestinal tract and lungs.
· They are detoxified by Cytochrome P450-mediated monoxygenases in the liver but some metabolites are more toxic than parent compounds.

Section 5 - FIRE FIGHTING MEASURES

Vapor Pressure (mmHg):	0.008 @20C
Upper Explosive Limit (%):	Not available.
Specific Gravity (water=1):	1.425 @ 25C
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 full body protective clothing with breathing apparatus.
When any large container (including road and rail tankers) is involved in a fire,
consider evacuation by 800 metres in all directions.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS
· Combustible.
· Slight fire hazard when exposed to heat or flame.
Combustion products include: carbon dioxide (CO2), hydrogen chloride, phosgene, nitrogen oxides (NOx), phosphorus oxides (POx), other pyrolysis products typical of burning organic material.
May emit poisonous fumes.

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:
Type A-P Filter of sufficient capacity

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS
■ Slippery when spilt.
· Remove all ignition sources.
· Clean up all spills immediately.
MAJOR SPILLS
■ Slippery when spilt.
· DO NOT touch the spill material.
· Clear area of personnel and move upwind.
· Alert Emergency Responders and tell them location and nature of hazard.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

· DO NOT allow clothing wet with material to stay in contact with skin.
· Avoid all personal contact, including inhalation.
· Wear protective clothing when risk of exposure occurs.

RECOMMENDED STORAGE METHODS

· DO NOT use unlined steel containers.
· Lined metal can, Lined metal pail/drum
· Plastic pail.
For low viscosity materials
· Drums and jerricans must be of the non-removable head type.
· Where a can is to be used as an inner package, the can must have a screwed enclosure.
All inner and sole packagings for substances that have been assigned to Packaging Groups I or II on the basis of inhalation toxicity criteria, must be hermetically sealed.

STORAGE REQUIREMENTS

· Store in original containers.
· Keep containers securely sealed.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³	Peak ppm	Peak mg/m³	TWA F/CC	Notes
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)	dichlorvos (DICHLORVOS)	0.0003							
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)	dichlorvos (DICHLORVOS)	0.002							
US ATSDR Minimal Risk Levels for Hazardous Substances	dichlorvos (DICHLORVOS)	0.00006							

(MRLs)						
Canada - Alberta Occupational Exposure Limits	dichlorvos (Dichlorvos)		0.1			
US NIOSH Recommended Exposure Limits (RELs)	dichlorvos (Dichlorvos)		1			[skin]
US - Minnesota Permissible Exposure Limits (PELs)	dichlorvos (Dichlorvos (DDVP))		1			
Canada - British Columbia Occupational Exposure Limits	dichlorvos (Dichlorvos (DDVP), Inhalable)		0.1 (V)			Skin; 2B; S
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	dichlorvos (Dichlorvos (DDVP))		1			
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	dichlorvos (Dichlorvos (DDVP))		1			
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	dichlorvos (Dichlorvos (DDVP))		1			
US - California Permissible Exposure Limits for Chemical Contaminants	dichlorvos (Dichlorvos (DDVP); 2,2-dichlorovinyl dimethyl phosphate)	0.1	1			
US ACGIH Threshold Limit Values (TLV)	dichlorvos (Dichlorvos [DDVP])		0.1			TLV Basis: cholinesterase inhibition. BEI-A
US - Hawaii Air Contaminant Limits	dichlorvos (Dichlorvos (DDVP))	0.1	1	0.3	3	
US - Michigan Exposure Limits for Air Contaminants	dichlorvos (Dichlorvos (DDVP))		1			
US - Alaska Limits for Air Contaminants	dichlorvos (Dichlorvos (DDVP))		1			
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	dichlorvos (Dichlorvos (DDVP) - Skin)	0.1	1	0.3	3	
Canada - Saskatchewan Occupational Health and	dichlorvos (Dichlorvos (DDVP), (inhalable		0.1		0.3	Skin, SEN, T20

Safety Regulations - Contamination Limits	fraction++ and vapour))						
US - Washington Permissible exposure limits of air contaminants	dichlorvos (Dichlorvos (DDVP))	0.1		0.3			
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	dichlorvos (Dichlorvos (DDVP))		1				
Canada - Prince Edward Island Occupational Exposure Limits	dichlorvos (Dichlorvos [DDVP])		0.1				TLV Basis: cholinesterase inhibition. BEI-A
US OSHA Permissible Exposure Levels (PELs) - Table Z1	dichlorvos (Dichlorvos (DDVP))		1				
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	dichlorvos (Dichlorvos)	0.1	0.9				
Canada - Northwest Territories Occupational Exposure Limits (English)	dichlorvos (DDVP (Dichlorvos) - Skin)	0.1	0.9	0.3	2.7		
US - Oregon Permissible Exposure Limits (Z-1)	dichlorvos (Dichlorvos (DDVP))	0.1	1				
Canada - Nova Scotia Occupational Exposure Limits	dichlorvos (Dichlorvos [DDVP])		0.1				TLV Basis: cholinesterase inhibition. BEI-A

ENDOELTABLE

PERSONAL PROTECTION




RESPIRATOR

• type a-p filter of sufficient capacity.

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.

OTHER

· Overalls.
· Eyewash unit.
· Ensure that there is a supply of atropine tablets on hand
· Ensure all employees have been informed of symptoms of organophosphorus or carbamate poisoning and that the use of atropine in first aid is understood .

ENGINEERING CONTROLS

■ Local exhaust ventilation usually required. If risk of overexposure exists, wear an approved respirator.
If inhalation risk exists, wear SAA approved respirator with organic- vapour or pesticide cartridge.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Liquid.
Toxic or noxious vapours/gas.

State	Liquid	Molecular Weight	220.98
Melting Range (°F)	183	Viscosity	Not Available
Boiling Range (°F)	284 @ 2.6 KPa	Solubility in water (g/L)	Reacts
Flash Point (°F)	175	pH (1% solution)	Not available.
Decomposition Temp (°F)	Not Available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available.	Vapor Pressure (mmHg)	0.008 @20C
Upper Explosive Limit (%)	Not available.	Specific Gravity (water=1)	1.425 @ 25C
Lower Explosive Limit (%)	Not available.	Relative Vapor Density (air=1)	7.5
Volatile Component (%vol)	100% but V.Slow	Evaporation Rate	Slow

dichlorvos	
log Kow (Sangster 1997):	3.81
log Kow (Prager 1995):	2.03
log Kow (Sangster 1997):	1.43

APPEARANCE

Clear Colorless Liquid. Mixes with aromatic and chlorinated hydrocarbon solvents and alcohols.

log Kow 1.16-1.47

Material	Value

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

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

STORAGE INCOMPATIBILITY

■ Dichlorvos:

· is incompatible with sulfuric acid, alkalis, ammonia, aliphatic amines, alkanolamines, alkylene oxides, amides, epichlorohydrin, organic anhydrides, isocyanates, nitromethane, vinyl acetate
· is corrosive to black iron and mild steel. to aluminium and 316 stainless steel in presence of water
· attacks some plastics, rubber and coatings.
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.
Segregate from alcohol, water.
Avoid reaction with oxidizing agents.
· NOTE: May develop pressure in containers; open carefully. Vent periodically.

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

Section 11 - TOXICOLOGICAL INFORMATION

dichlorvos

TOXICITY AND IRRITATION

DICHLORVOS:
■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY	IRRITATION
Oral (rat) LD50: 17 mg/kg	Nil Reported
Inhalation (rat) LC50: 15 mg/m³/4h	
Dermal (rabbit) LD50: 107 mg/kg	

■ Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's edema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type.

For dichlorvos:

Acute toxicity: Dichlorvos is highly toxic by inhalation, dermal absorption, and ingestion . Because dichlorvos is volatile, inhalation is the most common route of exposure. As with all organophosphates, dichlorvos is readily absorbed through the skin. Acute illness from dichlorvos is limited to the effects of cholinesterase inhibition. Compared to poisoning by other organophosphates, dichlorvos causes a more rapid onset of symptoms, which is often followed by a similarly rapid recovery . This occurs because dichlorvos is rapidly metabolized and eliminated from the body. Persons with reduced lung function, convulsive disorders, liver disorders, or recent exposure to cholinesterase inhibitors will be at increased risk from exposure to dichlorvos. Alcoholic beverages may enhance the toxic effects of dichlorvos. High environmental temperatures or exposure of dichlorvos to light may enhance its toxicity . Dichlorvos is mildly irritating to skin . Concentrates of dichlorvos may cause burning sensations, or actual burns . Application of 1.67 mg/kg dichlorvos in rabbits' eyes produced mild redness and swelling, but no injury to the cornea .
Chronic toxicity: . Repeated, small doses generally have no effect on treated animals. Doses of up to 4 mg/kg of a slow release formulation, given to cows to reduce flies in their faeces, had no visibly adverse effects on the cows; but blood tests of these cows indicated cholinesterase inhibition . Feeding studies indicate that a dosage of dichlorvos very much larger than doses which inhibit cholinesterase are needed to produce illness. Rats tolerated dietary doses as high as 62.5 mg/kg/day for 90 days with no visible signs of illness, while a dietary level of 0.25 mg/kg/day for only 4 days produced a reduction in cholinesterase levels. Rats exposed to air concentrations of 0.5 mg/L of dichlorvos over a 5-week period exhibited significantly decreased cholinesterase activity in the plasma, red blood cells, and brain. Dogs fed dietary doses of 1.6 or 12.5 mg/kg/day for 2 years showed decreased red blood cell cholinesterase activity, increased liver weights, and increased liver cell size occurred. Chronic exposure to dichlorvos will cause fluid to build up in the lungs (pulmonary edema). Liver enlargement has occurred in pigs maintained for long periods of time on high doses . Dichlorvos caused adverse liver effects, and lung hemorrhages may occur at high doses in dogs . In male rats, repeated high doses caused abnormalities in the tissues of the lungs, heart, thyroid, liver, and kidneys.
Reproductive effects: There is no evidence that dichlorvos affects reproduction. When male and female rats were given a diet containing 5 mg/kg/day dichlorvos just before mating, and through pregnancy and lactation for females, there were no effects on reproduction or on the survival or growth of the offspring, even though severe cholinesterase inhibition occurred in the mothers and significant inhibition occurred in the offspring. The same results were observed in a three-generation study with rats fed dietary levels up to 25 mg/kg/day . Once in the bloodstream, dichlorvos may cross the placenta .
Teratogenic effects: There is no evidence that dichlorvos is teratogenic. A dose of 12 mg/kg/day was not teratogenic in rabbits and did not interfere with reproduction in any way. There was no evidence of teratogenicity when rats and rabbits were exposed to air concentrations of up to 6.25 mg/L throughout pregnancy. Dichlorvos was not teratogenic when given orally to rats .
Mutagenic effects: Dichlorvos can bind to molecules such as DNA. For this reason, there has been extensive testing of dichlorvos for mutagenicity. Several studies have shown dichlorvos to be a mutagen ; for example, dichlorvos is reported positive in the Ames mutagenicity assay and in other tests involving bacterial or animal cell cultures. However, no evidence of mutagenicity has been found in tests performed on live animals. Its lack of mutagenicity in live animals may be due to rapid metabolism and excretion .
Carcinogenic effects: Dichlorvos has been classified as a possible human carcinogen because it caused tumors in rats and mice in some studies but not others . When dichlorvos was administered by gavage (stomach tube) to mice for 5 days per week for 103 weeks at doses of 20 mg/kg/day in males and 40 mg/kg/day in females, there was an increased incidence of benign tumours in the lining of the stomach in both sexes. When rats were given doses of 4 or 8 mg/kg/day for 5 days per week for 103 weeks, there was an increased incidence of benign tumours of the pancreas and of leukemia in male rats at both doses. At the highest dose, there was also an increased incidence of benign lung tumors in males. In female rats, there was an increase in the incidence of benign tumors of the mammary gland. However, no tumours caused by dichlorvos were found in rats fed up to 25 mg/kg/day for 2 years, or in dogs fed up to 11 mg/kg/day for 2 years. No evidence of carcinogenicity was found when rats were exposed to air containing up to 5 mg/L for 23 hours/day for 2 years . A few tumours were found in the esophagus of mice given dichlorvos orally, even though tumors of this kind are

normally rare . In sum, current evidence about the carcinogenicity of dichlorvos is inconclusive.
Organ toxicity: Dichlorvos primarily affects the nervous system through cholinesterase inhibition, the blockage of an enzyme required for proper nerve functioning.
Fate in humans and animals: Among the organophosphates, dichlorvos is remarkable for its rapid metabolism and excretion by mammals. Exposure of rats to 11 mg/L (250 times the normal exposure) for 4 hours was required before dichlorvos was detectable in the rats. Even then, it was detected only in the kidneys. Following exposure to 50 mg/L, the half-life for dichlorvos in the rat kidney was 13.5 minutes . The reason for this rapid disappearance of dichlorvos is the presence of degrading enzymes in both tissues and blood plasma. When dichlorvos is absorbed after ingestion, it is moved rapidly to the liver where it is rapidly detoxified. Thus poisoning by nonlethal doses of dichlorvos is usually followed by rapid detoxification in the liver and recovery . Rats given oral or dermal doses at the LD50 level either died within 1 hour of dosing or recovered completely . Dichlorvos does not accumulate in body tissues and has not been detected in the milk of cows or rats, even when the animals were given doses high enough to produce symptoms of severe poisoning.
NOTE: Substance has been shown to be mutagenic in at least one assay, or belongs to a family of chemicals producing damage or change to cellular DNA.

The substance is classified by IARC as Group 3:

NOT classifiable as to its carcinogenicity to humans.
Evidence of carcinogenicity may be inadequate or limited in animal testing.
Human cell mutagen Reproductive effector in rats.
ADI: 0.0005 mg/kg/day
NOEL: 0.05 mg/kg/day

CARCINOGEN

Dichlorvos	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	2B
Dichlorvos	US EPA Carcinogens Listing	Carcinogenicity	B2
Dichlorvos	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	B2
Dichlorvos [DDVP]	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	A4
dichlorvos	US - Rhode Island Hazardous Substance List	IARC	
DICHLORVOS	US Environmental Defense Scorecard Recognized Carcinogens	Reference(s)	P65
DICHLORVOS	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s)	P65
ORGANOPHOSPHATE PESTICIDES	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s)	P65-MC
dichlorvos	US - Maine Chemicals of High Concern List	Carcinogen	B2
TWAMG_M3~	US - Maine Chemicals of High Concern List	Carcinogen	A4
VPVB_(VERY~	US - Maine Chemicals of High Concern List	Carcinogen	CA Prop 65; IRIS

SKIN

dichlorvos	US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants - Skin	Skin Designation	X
dichlorvos	US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants - Skin	Skin Designation	X
dichlorvos	US - Washington Permissible exposure limits of air contaminants - Skin	Skin	X
dichlorvos	US ACGIH Threshold Limit Values (TLV) - Skin	Skin Designation	Yes
dichlorvos	US AIHA Workplace Environmental Exposure Levels (WEELs) - Skin	Notes	TLV Basis: cholinesterase inhibition. BEI-A

dichlorvos	US NIOSH Recommended Exposure Limits (RELs) - Skin	Skin	Yes
dichlorvos	US - California OEHHA/ARB - Acute Reference Exposure Levels and Target Organs (RELs) - Skin	Skin	X
dichlorvos	US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs) - Skin	Skin	X
dichlorvos	US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants - Skin	Skin Designation	X
dichlorvos	Canada - British Columbia Occupational Exposure Limits - Skin	Notation	Skin; 2B; S
dichlorvos	US - Minnesota Permissible Exposure Limits (PELs) - Skin	Skin Designation	X
dichlorvos	US - Hawaii Air Contaminant Limits - Skin Designation	Skin Designation	X
dichlorvos	US OSHA Permissible Exposure Levels (PELs) - Skin	Skin Designation	X
dichlorvos	US - Oregon Permissible Exposure Limits (Z2) - Skin	Skin	X
dichlorvos	US - California Permissible Exposure Limits for Chemical Contaminants - Skin	Skin	X
dichlorvos	US - California Permissible Exposure Limits for Chemical Contaminants - Skin	Skin	S
dichlorvos	Canada - Alberta Occupational Exposure Limits - Skin	Substance Interaction	1

Section 12 - ECOLOGICAL INFORMATION

Very toxic to aquatic organisms.
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
dichlorvos	HIGH	No Data Available	MED	HIGH

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. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. 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. Special hazard may exist - specialist advicemay be required.

Section 14 - TRANSPORTATION INFORMATION

DOT:
Symbols: None Hazard class or Division: 6.1
Identification Numbers: UN3018 PG: II
Label Codes: 6.1 Special provisions: IB2, N76,
T11, TP2,
TP13, TP27
Packaging: Exceptions: 153 Packaging: Non- bulk: 202
Packaging: Exceptions: 153 Quantity limitations: 5 L
Passenger aircraft/rail:
Quantity Limitations: Cargo 60 L Vessel stowage: Location: B
aircraft only:
Vessel stowage: Other: 40 S.M.P.: Severe
Hazardous materials descriptions and proper shipping names:
Organophosphorus pesticides, liquid, toxic

Air Transport IATA:

UN/ID Number: 3018 Packing Group: II
Special provisions: A3
Cargo Only
Packing Instructions: 60 L Maximum Qty/Pack: 662
Passenger and Cargo Passenger and Cargo
Packing Instructions: 5 L Maximum Qty/Pack: 654
Passenger and Cargo Limited Quantity Passenger and Cargo Limited Quantity
Packing Instructions: 1 L Maximum Qty/Pack: Y641
Shipping Name: ORGANOPHOSPHORUS PESTICIDE, LIQUID, TOXIC
*(CONTAINS DICHLORVOS)

Maritime Transport IMDG:

IMDG Class: 6.1 IMDG Subrisk: None
UN Number: 3018 Packing Group: II
EMS Number: F-A , S-A Special provisions: 61 274
Limited Quantities: 100 ml Marine Pollutant: Yes
Shipping Name: ORGANOPHOSPHORUS PESTICIDE, LIQUID, TOXIC(contains dichlorvos)

Section 15 - REGULATORY INFORMATION

dichlorvos (CAS: 62-73-7) is found on the following regulatory lists;

"Canada - Alberta Occupational Exposure Limits","Canada - British Columbia Occupational Exposure Limits","Canada - Northwest Territories Occupational Exposure Limits (English)","Canada - Nova Scotia Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada - Saskatchewan Occupational Health and Safety Regulations - Designated Chemical Substances","Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances","Canada Domestic Substances List (DSL)","International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs","International Maritime Dangerous Goods Requirements (IMDG Code) - Marine Pollutants","International Maritime Dangerous Goods Requirements (IMDG Code) - Substance Index","US - Alaska Limits for Air Contaminants","US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which emissions must be quantified","US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List","US - California Permissible Exposure Limits for Chemical Contaminants","US - California Proposition 65 - Carcinogens","US - California Toxic Air Contaminant List Category VI","US - Connecticut Hazardous Air Pollutants","US - Hawaii Air Contaminant Limits","US - Maine Chemicals of High Concern List","US - Michigan Exposure Limits for Air Contaminants","US - Minnesota Hazardous Substance List","US - Minnesota Permissible Exposure Limits (PELs)","US - New Jersey Right to Know Hazardous Substances","US - Oregon Permissible Exposure Limits (Z-1)","US - Rhode Island Hazardous Substance List","US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants","US - Washington Permissible exposure limits of air contaminants","US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants","US ACGIH Threshold Limit Values (TLV)","US ACGIH Threshold Limit Values (TLV) - Carcinogens","US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)","US CERCLA Priority List of Hazardous Substances","US Clean Air Act - Hazardous Air Pollutants","US CWA (Clean Water Act) - List of Hazardous Substances","US CWA (Clean Water Act) - Reportable Quantities of Designated Hazardous Substances","US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities

- Hazardous Substances Other Than Radionuclides","US Department of Transportation (DOT) Marine Pollutants - Appendix B","US DOE Temporary Emergency Exposure Limits (TEELs)","US EPA Acute Exposure Guideline Levels (AEGLs) - Proposed","US EPA Carcinogens Listing","US EPA High Production Volume Chemicals 1994 List of Additions","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","US NIOSH Recommended Exposure Limits (RELs)","US OSHA Permissible Exposure Levels (PELs) - Table Z1","US SARA Section 302 Extremely Hazardous Substances","US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

■ Cumulative effects may result following exposure*.
■ May produce discomfort of the eyes*.
■ Limited evidence of a carcinogenic effect*.
■ May be harmful to the foetus/ embryo*.
■ Exposure may produce irreversible effects*.
* (limited evidence).

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■ 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.

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