Material Safety Data Sheet

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Version 1.4
According to 91/155/EEC

1 - Product and Company Information

Product Name	DICHLORVOS PESTANAL (2,2-DICHLORO-VINYL DIMETHYL PHOSPHATE), 250 MG
Product Number	45441
Company	Sigma-Aldrich Pte Ltd #08-01 Citilink Warehouse Singapore 118529 Singapore
Technical Phone #	65 271 1089
Fax	65 271 1571

2 - Composition/Information on Ingredients

Product Name	CAS #	EC no	Annex I Index Number
DICHLORVOS PESTANAL (DDVP)	62-73-7	200-547-7	015-019-00-X

Formula	C4H7Cl2O4P
Molecular Weight	220.98 AMU
Synonyms	Apavap * Astrobot * Atgard * Atgard C * Atgard V * BAY-19149 * Bayer 19149 * Benfos * Bibesol * Brevinyl * Brevinyl E50 * Canogard * Chlorvinphos * Cypona * DDVP (OSHA) * DDVP (insecticide) * Dedevap * Denkavepon * Deriban * Derribante * Devikol * Dichlofos * (2,2-Dichloor-vinyl)-dimethyl-fosfaat (Dutch) * Dichloorvo (Dutch) * Dichlorfos (Polish) * Dichlorman * 2,2-Dichloroethenyl dimethyl phosphate * 2,2-Dichloroethenyl phosphoric acid dimethyl este * (2,2-Dichloro-vinil)dimetil-fosfato (Italian) * 2,2-Dichlorovinyl dimethyl phosphate * 2,2-Dichlorovinyl dimethyl phosphoric acid ester * Dichlorovos * (2,2-Dichlor-vinyl)-dimethyl-phosphat (German) * O-(2,2-Dichlorvinyl)-O,O-dimethylphosphat (German * Dichlorvos (ACGIH:OSHA) * Dimethyl 2,2-dichloroethenyl phosphate * Dimethyl dichlorovinyl phosphate * Dimethyl 2,2-dichlorovinyl phosphate * O,O-Dimethyl dichlorovinyl phosphate * O,O-Dimethyl 2,2-dichlorovinyl phosphate * O,O-Dimethyl

3 - Hazards Identification

SPECIAL INDICATION OF HAZARDS TO HUMANS AND THE ENVIRONMENT
Toxic in contact with skin and if swallowed. Very toxic by inhalation. May cause sensitization by skin contact. Very toxic to aquatic organisms.

4 - First Aid Measures

AFTER INHALATION
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

AFTER SKIN CONTACT
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

AFTER EYE CONTACT
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

AFTER INGESTION
If swallowed, wash out mouth with water provided person is conscious. Call a physician immediately.

5 - Fire Fighting Measures

EXTINGUISHING MEDIA
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

SPECIAL RISKS
Specific Hazard(s): Emits toxic fumes under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS
Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

6 - Accidental Release Measures

PERSONAL PRECAUTION PROCEDURES TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Cover with dry-lime, sand, or soda ash. Place in covered containers using non-sparking tools and transport outdoors. Ventilate area and wash spill site after material pickup is complete.

7 - Handling and Storage

HANDLING
Directions for Safe Handling: Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure. Do not breathe vapor.

STORAGE
Conditions of Storage: Keep tightly closed.

8 - Exposure Controls / Personal Protection

ENGINEERING CONTROLS
Safety shower and eye bath. Use only in a chemical fume hood.

GENERAL HYGIENE MEASURES
Wash contaminated clothing before reuse. Wash thoroughly after handling.

EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	1 MG/M3
Poland		NDSCh	3 MG/M3
Poland		NDSP	-

EXPOSURE LIMITS - DENMARK

Source	Type	Value
OEL	TWA	1 mg/m3
		0.1 ppm

Remarks: HK

EXPOSURE LIMITS - GERMANY

Source	Type	Value
TRGS 900	OEL	0.9 mg/m3
		0.1 ppm

Remarks: 4
Remarks: H,Y

EXPOSURE LIMITS - NORWAY

Source	Type	Value
	OEL	1 mg/m3
		0.1 ppm

Remarks: HK

EXPOSURE LIMITS - SWITZERLAND

Source	Type	Value
OEL	OEL	1 mg/m3
		0.1 ppm

Remarks: H C

EXPOSURE LIMITS - UNITED KINGDOM

Source	Type	Value
OEL	OEL	0.92 mg/m3
		0.1 ppm
OEL	STEL	2.8 mg/m3
		0.3 ppm

Remarks: Skin

PERSONAL PROTECTIVE EQUIPMENT
Respiratory Protection: Government approved respirator.
Hand Protection: Compatible chemical-resistant gloves.
Eye Protection: Chemical safety goggles.

9 - Physical and Chemical Properties

Appearance: Physical State: Liquid
Color: Yellow

Property	Value	At Temperature or Pressure
pH	N/A	
BP/BP Range	74 °C	760 mmHg
MP/MP Range	N/A	
Flash Point	100 °C	Method: closed cup
Flammability	N/A	
Autoignition Temp	N/A	

Oxidizing Properties	N/A	
Explosive Properties	N/A	
Explosion Limits	N/A	
Vapor Pressure	0.012 mmHg	20 °C
SG/Density	1.42 g/cm3	20 °C
Partition Coefficient	N/A	
Viscosity	N/A	
Vapor Density	N/A	
Saturated Vapor Conc.	N/A	
Evaporation Rate	N/A	
Bulk Density	N/A	
Decomposition Temp.	N/A	
Solvent Content	N/A	
Water Content	N/A	
Surface Tension	N/A	
Conductivity	N/A	
Miscellaneous Data	N/A	
Solubility	Solubility in Water:Soluble. Other Solvents: 10 G/L WATER, ORGANIC SOLVENTS	

10 - Stability and Reactivity

STABILITY
Stable: Stable.
Materials to Avoid: Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide, Hydrogen chloride gas, Phosphorous oxides.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

11 - Toxicological Information

RTECS NUMBER: TC0350000

ACUTE TOXICITY

LD50
Oral
Rat
17 mg/kg

LC50
Inhalation
Rat
15 mg/m3
4H
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Lacrimation. Behavioral:Tremor. Gastrointestinal:Changes in structure or function of salivary glands.

LD50
Skin
Rat
0.75 mg/kg

LD50
Intraperitoneal

Rat
15 MG/KG
Remarks: Brain and Coverings:Other degenerative changes. Blood:Other changes. Biochemical:Enzyme inhibition, induction, or change in blood or tissue levelsTrue cholinesterase.

LD50
Subcutaneous
Rat
10800 UG/KG

LD50
Oral
Mouse
61 mg/kg

LC50
Inhalation
Mouse
13 mg/m3
4H
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Lacrimation. Behavioral:Tremor. Gastrointestinal:Changes in structure or function of salivary glands.

LD50
Skin
Mouse
206 mg/kg

LD50
Intraperitoneal
Mouse
22 MG/KG
Remarks: Biochemical:Enzyme inhibition, induction, or change in blood or tissue levelsTrue cholinesterase.

LD50
Subcutaneous
Mouse
24 MG/KG
Remarks: Behavioral:Convulsions or effect on seizure threshold. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Other. Lungs, Thorax, or Respiration:Dyspnea.

LD50
Intravenous
Mouse
18 MG/KG

LD50
Oral
Dog
100 mg/kg

LD50
Oral
Rabbit
10 mg/kg
Remarks: Autonomic Nervous System:Other (direct) parasympathomimetic. Biochemical:Enzyme inhibition, induction,

or change in blood or tissue levelsTrue cholinesterase.

LD50
Skin
Rabbit
107 mg/kg

LD50
Oral
Pig
157 mg/kg
Remarks: Gastrointestinal:Nausea or vomiting. Biochemical:Enzyme inhibition, induction, or change in blood or tissue levelsTrue cholinesterase.

LD50
Intraperitoneal
Hamster
30 MG/KG

LD50
Oral
Pigeon
23.7 mg/kg

LD50
Oral
Chicken
6.45 mg/kg
Remarks: Biochemical:Enzyme inhibition, induction, or change in blood or tissue levelsTrue cholinesterase.

LD50
Oral
Quail
22.01 mg/kg
Remarks: Behavioral:Tremor. Behavioral:Convulsions or effect on seizure threshold. Gastrointestinal:Hypermotility, diarrhea.

LD50
Oral
Duck
7.8 mg/kg

LD50
Oral
Bird (wild)
12 mg/kg

SENSITIZATION
Skin: May cause allergic skin reaction.

SIGNS AND SYMPTOMS OF EXPOSURE
Cholinesterase inhibitors can cause heavy salivation and secretion in the lungs, lachrymation, blurred vision, involuntary defecation, diarrhea, tremor, ataxia, sweating, hypothermia, lowered heart rate, and/or a fall in blood pressure as a result of their action at cholinergic nerve sites. Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer. Exposure can cause: Salivation. Coma. Tremors. Incoordination. Blurred vision. Hypotension.

Diarrhea. Headache. Weakness. Unconsciousness. Heart palpitations. Anorexia. Convulsions. Sweating. Muscle cramps/spasms. Change in pupil size. Nausea. Vomiting. Dizziness. Drowsiness. Confusion.

ROUTE OF EXPOSURE

Skin Contact: May cause skin irritation.
Skin Absorption: Toxic if absorbed through skin.
Eye Contact: May cause eye irritation.
Inhalation: May be fatal if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.
Ingestion: Toxic if swallowed.

TARGET ORGAN INFORMATION

Central nervous system. Blood. Heart. Eyes. Liver.

CHRONIC EXPOSURE - CARCINOGEN

Result: This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Rat
Route of Application: Oral
Exposure Time: 2Y
Result: Tumorigenic:Neoplastic by RTECS criteria. Lungs, Thorax, or Respiration:Tumors. Gastrointestinal:Tumors.

Rat
Route of Application: Oral
Exposure Time: 2Y
Result: Tumorigenic:Carcinogenic by RTECS criteria. Gastrointestinal:Tumors. Blood:Leukemia

Mouse
Route of Application: Oral
Exposure Time: 2Y
Result: Tumorigenic:Carcinogenic by RTECS criteria. Gastrointestinal:Tumors.

IARC CARCINOGEN LIST

Rating: Group 2B

CHRONIC EXPOSURE - MUTAGEN

Result: Laboratory experiments have shown mutagenic effects.

Human
62 MG/L
Cell Type: lymphocyte
DNA damage

Human
970 UMOL/L
Cell Type: HeLa cell
DNA damage

Human
65 MMOL/L
Cell Type: Other cell types
Unscheduled DNA synthesis

Human

62 MG/L
Cell Type: lymphocyte
DNA inhibition

Human
1 MG/L
Cell Type: lymphocyte
Cytogenetic analysis

Rat
40 MG/L
Cell Type: Other cell types
Morphological transformation.

Rat
80 MG/L
Cell Type: Other cell types
Cytogenetic analysis

Rat
10 MG/L
Cell Type: Other cell types
Sister chromatid exchange

Mouse
420 UG/KG
Intraperitoneal
DNA damage

Mouse
8 MG/KG
Inhalation
DNA damage

Mouse
12500 MG/L
Cell Type: lymphocyte
Mutation in mammalian somatic cells.

Mouse
4 MG/L
Cell Type: S. cerevisiac
Host-mediated assay

Mouse
35 MG/KG
Intraperitoneal
5D
sperm

Hamster
110 UMOL/L
Cell Type: Embryo
Morphological transformation.

Hamster
2000 PPM
60M
Cell Type: lung
DNA damage

Hamster

3 MG/KG
Intraperitoneal
Cytogenetic analysis

Hamster
100 MG/L
Cell Type: lung
Cytogenetic analysis

Hamster
160 MG/L
Cell Type: ovary
Cytogenetic analysis

Hamster
30 UMOL/L
Cell Type: ovary
Sister chromatid exchange

Hamster
100 UMOL/L
Cell Type: lung
Sister chromatid exchange

Mammal
100 UL
Cell Type: lymphocyte
DNA damage

CHRONIC EXPOSURE - TERATOGEN

Species: Rat
Dose: 15 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (11D PREG)
Result: Specific Developmental Abnormalities: Body wall.

Species: Rabbit
Dose: 4 MG/M3/23H
Route of Application: Inhalation
Exposure Time: (1-28D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Pig
Dose: 255 MG/KG
Route of Application: Oral
Exposure Time: (41-70D PREG)
Result: Specific Developmental Abnormalities: Central nervous system. Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow). Specific Developmental Abnormalities: Endocrine system.

Species: Guinea pig
Dose: 90 MG/KG
Route of Application: Unreported
Exposure Time: (42-44D PREG)
Result: Specific Developmental Abnormalities: Central nervous system.

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD
Result: Overexposure may cause reproductive disorder(s) based on

tests with laboratory animals.

Species: Rat
Dose: 39200 UG/KG
Route of Application: Oral
Exposure Time: (14-21D PREG)
Result: Effects on Newborn: Biochemical and metabolic.

Species: Rat
Dose: 220 MG/KG
Route of Application: Oral
Exposure Time: (MULTIGENERATION)
Result: Effects on Newborn: Growth statistics (e.g., reduced weight gain). Effects on Newborn: Physical. Effects on Newborn: Delayed effects.

Species: Rat
Dose: 40 MG/KG
Route of Application: Unreported
Exposure Time: (2D MALE)
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology,motility, and count). Paternal Effects: Testes, epididymis, sperm duct.

Species: Mouse
Dose: 180 MG/KG
Route of Application: Oral
Exposure Time: (18D MALE)
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology,motility, and count).

Species: Rabbit
Dose: 65 MG/KG
Route of Application: Oral
Exposure Time: (6-13D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Rabbit
Dose: 60 MG/KG
Route of Application: Oral
Exposure Time: (22-31D PREG)
Result: Effects on Newborn: Biochemical and metabolic.

Species: Rabbit
Dose: 60 MG/KG
Route of Application: Unreported
Exposure Time: (22-31D PREG)
Result: Effects on Newborn: Biochemical and metabolic.

Species: Pig
Dose: 759 MG/KG
Route of Application: Oral
Exposure Time: (1-15W PREG/4W POST)
Result: Effects on Newborn: Biochemical and metabolic.

12 - Ecological Information

N/A

ECOTOXICOLOGICAL EFFECTS
Test Type: LC50 Fish

Species: Lepomis macrochirus (Bluegill)
Time: 96 h
Value: 0.869 mg/l

Test Type: LC50 Fish
Species: Lepomis macrochirus (Bluegill)
Time: 48 h
Value: 0.7 mg/l

13 - Disposal Considerations

SUBSTANCE DISPOSAL
Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

14 - Transport Information

RID/ADR
UN#: 2810
Class: 6.1
PG: II
Proper Shipping Name: Toxic liquid, organic, n.o.s.

IMDG
UN#: 2810
Class: 6.1
PG: II
Proper Shipping Name: Toxic liquid, organic, n.o.s.
Marine Pollutant: No
Severe Marine Pollutant: Yes
Technical Name: Required

IATA
UN#: 2810
Class: 6.1
PG: II
Proper Shipping Name: Toxic liquid, organic, n.o.s.
Inhalation Packing Group I: No
Technical Name: Required

15 - Regulatory Information

CLASSIFICATION AND LABELING ACCORDING TO EU DIRECTIVES
ANNEX I INDEX NUMBER: 015-019-00-X
INDICATION OF DANGER: T+ N
Very toxic. Dangerous for the environment.
R-PHRASES: 24/25 26 43 50
Toxic in contact with skin and if swallowed. Very toxic by inhalation. May cause sensitization by skin contact. Very toxic to aquatic organisms.
S-PHRASES: 1/2 28 36/37 45 61
Keep locked up and out of the reach of children. After contact with skin, wash immediately with plenty of soap-suds. Wear suitable protective clothing and gloves. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Avoid release to the environment. Refer to special instructions/safety data sheets.

COUNTRY SPECIFIC INFORMATION

Germany
WGK: 3

SWITZERLAND
SWISS POISON CLASS: 2

16 - Other Information

WARRANTY
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

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