

Material Safety Data Sheet

Date Printed: 15/DEC/2004

Date Updated: 22/JUL/2004

Version 1.2

According to 91/155/EEC

1 - Product and Company Information

Product Name	METHYL VIOLOGEN DICHLORIDE HYDRATE, 98%
Product Number	856177
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
1,1'-DIMETHYL-4,4'-BIPYRIDINIUM DICHLORIDE	1910-42-5	217-615-7	613-090-00-7

Formula C12H14Cl2N2

Molecular Weight 257.17 AMU

Synonyms AH 501 * Bipyridinium, 1,1'-dimethyl-4,4'-,
dichloride * Cekuquat * Crisquat * Dextrone *
Dextrone-X * Dexuron *
N,N'-Dimethyl-4,4'-bipyridinium dichloride *
1,1'-Dimethyl-4,4'-bipyridynium dichloride *
1,1'-Dimethyl-4,4'-dipyridinium-dichlorid
(German * 4,4'-Dimethyldipyridyl dichloride *
Dimethyl viologen chloride * Dwuchlorek
1,1'-dwumetylo-4,4'-dwupirydyniowy (Polish) *
Esgram * Galokson * Goldquat 276 * Gramixel *
Gramoxon * Gramoxone * Gramoxone D * Gramoxone
dichloride * Gramoxone S * Gramoxone W *
Gramuron * Herbaxon * Herboxone * Methylviologen
* Methyl viologen dichloride * Methyl viologen
(reduced) * OK 622 * Ortho paraquat CL *
Parakwat (Polish) * Paraquat (OSHA) * Paraquat
chloride * Paraquat CL * Paraquat, dichloride *
Pathclear * Pillarquat * Pillarxone * Toxer
total * Viologen, methyl-

3 - Hazards Identification

SPECIAL INDICATION OF HAZARDS TO HUMANS AND THE ENVIRONMENT

Toxic in contact with skin and if swallowed. Irritating to respiratory system and skin. Limited evidence of a carcinogenic effect. Risk of serious damage to eyes. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

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

Sweep up, place in a bag and hold for waste disposal. Avoid raising dust. Ventilate area and wash spill site after material pickup is complete.

7 - Handling and Storage

HANDLING

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

STORAGE

Conditions of Storage: Keep tightly closed.

8 - Exposure Controls / Personal Protection

ENGINEERING CONTROLS

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

GENERAL HYGIENE MEASURES

Wash contaminated clothing before reuse. Wash thoroughly after handling.

EXPOSURE LIMITS - DENMARK

Source	Type	Value
OEL	TWA	0.1 mg/m3

Remarks: H

EXPOSURE LIMITS - GERMANY

Source	Type	Value
TRGS 900	OEL	0.1 mg/m3, E

Remarks: =1=

Remarks: H

EXPOSURE LIMITS - NORWAY

Source	Type	Value
	OEL	0.1 mg/m3

Remarks: H

EXPOSURE LIMITS - SWITZERLAND

Source	Type	Value
OEL	OEL	0.1 mg/m3

Remarks: E H

EXPOSURE LIMITS - UNITED KINGDOM

Source	Type	Value
OEL	OEL	0.08 mg/m3

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: Solid
	Color: Slightly yellow
	Form: Fine crystals

Property	Value	At Temperature or Pressure
pH	N/A	
BP/BP Range	N/A	
MP/MP Range	> 300 °C	
Flash Point	N/A	
Flammability	N/A	
Autoignition Temp	N/A	
Oxidizing Properties	N/A	
Explosive Properties	N/A	
Explosion Limits	N/A	
Vapor Pressure	N/A	
SG/Density	N/A	
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	

10 - Stability and Reactivity

STABILITY

Stable: Stable.

Materials to Avoid: Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide, Nitrogen oxides, Hydrogen chloride gas.

HAZARDOUS POLYMERIZATION

Hazardous Polymerization: Will not occur

11 - Toxicological Information

RTECS NUMBER: DW2275000

ACUTE TOXICITY

LDLO

Oral

Man

1720 mg/kg

Remarks: Lungs, Thorax, or Respiration:Acute pulmonary edema.

Liver:Liver function tests impaired. Kidney, Ureter,

Bladder:Changes in tubules (including acute renal failure, acute tubular necrosis).

LDLO

Oral

Man

3380 UL/KG

Remarks: Lungs, Thorax, or Respiration:Fibrosis, focal

(pneumoconiosis). Lungs, Thorax, or Respiration:Dyspnea. Lungs, Thorax, or Respiration:Sputum.

LDLO

Oral

Human

214 mg/kg

Remarks: Lungs, Thorax, or Respiration:Chronic pulmonary edema.

Lungs, Thorax, or Respiration:Other changes.

LDLO

Oral

Woman

3000 mg/kg

Remarks: Behavioral:Headache. Lungs, Thorax, or

Respiration:Cough. Gastrointestinal:Nausea or vomiting.

LDLO

Oral

Man

43 mg/kg

Remarks: Liver:Other changes. Kidney, Ureter, Bladder:Changes in both tubules and glomeruli. Kidney, Ureter, Bladder:Urine volume decreased.

LDLO

Oral

Woman
111 mg/kg
Remarks: Lungs, Thorax, or Respiration:Dyspnea.
Gastrointestinal:Ulceration or bleeding from stomach. Kidney,
Ureter, Bladder:Changes in tubules (including acute renal
failure, acute tubular necrosis).

LDLO
Subcutaneous
Man
3 UL/KG
Remarks: Autonomic Nervous System:Other (direct)
parasympathomimetic. Behavioral:Change in motor activity
(specific assay). Liver:Jaundice, other or unclassified.

LDLO
Parenteral
Man
57 UL/KG
Remarks: Lungs, Thorax, or Respiration:Fibrosis, focal
(pneumoconiosis). Liver:Hepatitis (hepatocellular necrosis),
diffuse. Kidney, Ureter, Bladder:Other changes.

LDLO
Multiple
Woman
12200 UG/KG
30D-I
Remarks: Lungs, Thorax, or Respiration:Fibrosis, focal
(pneumoconiosis). Blood:Changes in cell count (unspecified).
Nutritional and Gross Metabolic:Changes in:Body temperature
increase.

LD50
Oral
Rat
57 mg/kg

LC50
Inhalation
Rat
1 mg/m3
6H
Remarks: Lungs, Thorax, or Respiration:Dyspnea. Lungs, Thorax,
or Respiration:Respiratory stimulation. Skin and Appendages:
Other: Hair.

LD50
Skin
Rat
80 mg/kg

LD50
Intraperitoneal
Rat
19 MG/KG
Remarks: Brain and Coverings:Recordings from specific areas of
CNS. Behavioral:Change in motor activity (specific assay).
Lungs, Thorax, or Respiration:Respiratory stimulation.

LD50
Subcutaneous

Rat
27 MG/KG

LD50
Intravenous
Rat
21 MG/KG

Remarks: Lungs, Thorax, or Respiration:Acute pulmonary edema.
Gastrointestinal:Hypermotility, diarrhea. Skin and Appendages:
Other: Hair.

LD50
Oral
Mouse
120 mg/kg
Remarks: Lungs, Thorax, or Respiration:Fibrosis (interstitial).
Biochemical:Metabolism (intermediary):Lipids including transport.

LD50
Intraperitoneal
Mouse
20 MG/KG
Remarks: Lungs, Thorax, or Respiration:Acute pulmonary edema.
Lungs, Thorax, or Respiration:Other changes.

LD50
Subcutaneous
Mouse
37 MG/KG

LD50
Intravenous
Mouse
180 MG/KG

LD50
Oral
Dog
25 mg/kg

LD50
Oral
Monkey
50 mg/kg
Remarks: Behavioral:Convulsions or effect on seizure threshold.
Lungs, Thorax, or Respiration:Emphysema. Kidney, Ureter,
Bladder:Changes in tubules (including acute renal failure, acute
tubular necrosis).

LD50
Oral
Cat
35 mg/kg

LD50
Skin
Rabbit
325 mg/kg
Remarks: Skin and Appendages:Skin: After topical exposure:
Cutaneous sensitization (experimental).

LD50

Intraperitoneal
Rabbit
18 MG/KG
Remarks: Behavioral:Excitement. Behavioral:Change in motor activity (specific assay). Lungs, Thorax, or Respiration:Dyspnea.

LD50
Oral
Pig
30 mg/kg

LD50
Oral
Guinea pig
22 mg/kg
Remarks: Behavioral:Somnolence (general depressed activity). Lungs, Thorax, or Respiration:Other changes.

LD50
Intraperitoneal
Guinea pig
3 MG/KG

LD50
Oral
Chicken
262 mg/kg

LD50
Oral
Duck
199 mg/kg

LD50
Skin
Duck
600 mg/kg

LD50
Parenteral
Frog
260 MG/KG

LD50
Skin
Turkey
375 mg/kg
Remarks: Gastrointestinal:Hypermotility, diarrhea.

LD50
Oral
Domestic Animals
30 mg/kg

LD50
Intravenous
Domestic Animals
1 MG/KG

IRRITATION DATA

Eyes

Rabbit
25 mg
Remarks: Mild irritation effect

Eyes
Rabbit
12.5 mg
Remarks: Severe irritation effect

SIGNS AND SYMPTOMS OF EXPOSURE

Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting.

ROUTE OF EXPOSURE

Skin Contact: Causes skin irritation.
Skin Absorption: Toxic if absorbed through skin. Readily absorbed through skin.
Eye Contact: Causes severe eye irritation.
Inhalation: May be harmful if inhaled. Material is irritating to mucous membranes and upper respiratory tract.
Ingestion: Toxic if swallowed.

TARGET ORGAN INFORMATION

Kidneys. Liver. Cardiovascular system. Central nervous system.
Brain. Lungs. Blood.

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.

CHRONIC EXPOSURE - MUTAGEN

Human
250 MG/L
Cell Type: lymphocyte
DNA damage

Human
20 MG/L
Cell Type: fibroblast
Unscheduled DNA synthesis

Human
20 MG/L
Cell Type: Other cell types
Unscheduled DNA synthesis

Human
900 MG/L
Cell Type: lymphocyte
DNA inhibition

Human
7715 MG/L
Cell Type: lymphocyte
Cytogenetic analysis

Rat
1 UMOL/L
Cell Type: lung

DNA damage

Rat
900 MG/L
Cell Type: Other cell types
DNA inhibition

Rat
126 MG/KG
Oral
Other mutation test systems

Rat
126 MG/KG
Oral
DNA inhibition

Rat
1250 UG/L
Cell Type: Other cell types
Sister chromatid exchange

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

Hamster
20 UMOL/L
Cell Type: lung
Cytogenetic analysis

Hamster
100 MG/L
Cell Type: ovary
Cytogenetic analysis

Hamster
1 MMOL/L
Cell Type: fibroblast
Sister chromatid exchange

Hamster
80 NMOL/L
Cell Type: lung
Sister chromatid exchange

Hamster
100 MG/L
Cell Type: ovary
Sister chromatid exchange

Chicken
50 MG/L
Cell Type: liver
Other mutation test systems

CHRONIC EXPOSURE - TERATOGEN

Species: Rat
Dose: 6500 UG/KG
Route of Application: Intraperitoneal

Exposure Time: (6D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system.

Species: Rat
Dose: 7 MG/KG
Route of Application: Subcutaneous
Exposure Time: (21D PREG)
Result: Specific Developmental Abnormalities: Cardiovascular (circulatory) system.

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat
Dose: 149 MG/KG
Route of Application: Oral
Exposure Time: (7-17D PREG)
Result: Maternal Effects: Other effects.

Species: Rat
Dose: 14 MG/KG
Route of Application: Oral
Exposure Time: (1-3D PREG)
Result: Maternal Effects: Parturition. Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea). Effects on Fertility: Other measures of fertility

Species: Rat
Dose: 300 MG/KG
Route of Application: Oral
Exposure Time: (1-3D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Newborn: Live birth index (# fetuses per litter; measured after birth).

Species: Rat
Dose: 14 MG/KG
Route of Application: Oral
Exposure Time: (1-3D PREG)
Result: Effects on Newborn: Stillbirth.

Species: Mouse
Dose: 1163 GM/KG
Route of Application: Oral
Exposure Time: (MULTIGENERATION)
Result: Effects on Fertility: Female fertility index (e.g., # females pregnant per # sperm positive females; # females pregnant per # females mated).

Species: Mouse
Dose: 1785 GM/KG
Route of Application: Oral
Exposure Time: (MULTIGENERATION)
Result: Effects on Newborn: Other postnatal measures or effects.

Species: Mouse
Dose: 30150 UG/KG
Route of Application: Intraperitoneal
Exposure Time: (8-16D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g.,

dead and/or resorbed implants per total number of implants).

12 - Ecological Information

ECOTOXICOLOGICAL EFFECTS

Test Type: EC50 Daphnia

Species: Daphnia magna

Time: 48 h

Value: 2.8 mg/l

Test Type: LC50 Fish

Species: Lepomis macrochirus (Bluegill)

Time: 96 h

Value: 13 mg/l

Test Type: LC50 Fish

Species: Onchorhynchus mykiss (Rainbow trout)

Time: 96 h

Value: 15 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#: 2811

Class: 6.1

PG: I

Proper Shipping Name: Toxic solid, organic, n.o.s.

IMDG

UN#: 2811

Class: 6.1

PG: I

Proper Shipping Name: Toxic solid, organic, n.o.s.

Marine Pollutant: No

Severe Marine Pollutant: No

Technical Name: Required

IATA

UN#: 2811

Class: 6.1

PG: I

Proper Shipping Name: Toxic solid, organic, n.o.s.

Inhalation Packing Group I: Yes

Technical Name: Required

15 - Regulatory Information

CLASSIFICATION AND LABELING ACCORDING TO EU DIRECTIVES

ANNEX I INDEX NUMBER: 613-090-00-7

INDICATION OF DANGER: T N

Toxic. Dangerous for the environment.

R-PHRASES: 24/25 37/38 40 41 51/53

Toxic in contact with skin and if swallowed. Irritating to respiratory system and skin. Limited evidence of a carcinogenic effect. Risk of serious damage to eyes. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

S-PHRASES: 22 36/37/39 45 61

Do not breathe dust. Wear suitable protective clothing, gloves, and eye/face protection. 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.

SWITZERLAND

SWISS POISON CLASS: 1

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. Copyright 2004 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.

DISCLAIMER

For R&D use only. Not for drug, household or other uses.