

## Material Safety Data Sheet

Date Printed: 23/JUN/2004  
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Version 1.2  
According to 91/155/EEC

Classified as Hazardous according to the criteria of EU Annex 1 and NOHSC.

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### 1 - Product and Company Information

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Product Name	HEXAMETHYLPHOSPHORAMIDE, 99%
Product Number	H11602
Company	Sigma-Aldrich Pty, Ltd Unit 2, 14 Anella Avenue Castle Hill NSW 1765 Australia
Technical Phone #	+61 2 9841 0555
Fax	+61 2 9841 0500
Emergency Phone #	+61 2 9841 0566

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### 2 - Composition/Information on Ingredients

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Product Name	CAS #	EC no	Annex I Index Number
HEXAMETHYLPHOSPHORAMIDE	680-31-9	211-653-8	015-106-00-2
Formula	C <sub>6</sub> H <sub>18</sub> N <sub>3</sub> OP		
Molecular Weight	179.2 AMU		
Synonyms	Eastman Inhibitor HPT * ENT 50882 * Hempa * Hexametapol * Hexamethylfosforamid (Czech) * Hexamethyl phosphoramide (ACGIH) * Hexamethylphosphoric acid triamide * Hexamethylphosphoric triamide * N,N,N,N,N-Hexamethylphosphoric triamide * Hexamethylphosphorotriamide * Hexamethylphosphotriamide * Hexmethylphosphoramide * HMPA * HMPT * HPT * Phosphoric acid hexamethyltriamide * Phosphoric tris(dimethylamide) * Phosphoryl hexamethyltriamide * Tri(dimethylamino)phosphineoxide * Tris-(dimethylamid) kyseliny fosforecne (Czech) * Tris(dimethylamino)phosphine oxide * Tris(dimethylamino)phosphorus oxide		

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### 3 - Hazards Identification

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#### SPECIAL INDICATION OF HAZARDS TO HUMANS AND THE ENVIRONMENT

May cause cancer. May cause heritable genetic damage.  
Carc. Cat.2 Muta. Cat.2

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### 4 - First Aid Measures

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#### AFTER INHALATION

If inhaled, remove to fresh air. If breathing becomes difficult, call a physician.

#### AFTER SKIN CONTACT

In case of contact, immediately wash skin with soap and copious amounts of water.

#### 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.

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### 5 - Fire Fighting Measures

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#### 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.

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### 6 - Accidental Release Measures

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#### 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. Wear disposable coveralls and discard them after use.

#### METHODS FOR CLEANING UP

Absorb on sand or vermiculite and place in closed containers for disposal. Ventilate area and wash spill site after material pickup is complete.

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### 7 - Handling and Storage

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#### HANDLING

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

#### STORAGE

Conditions of Storage: Keep tightly closed.

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### 8 - Exposure Controls / Personal Protection

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#### 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

Country	Source	Type	Value
Poland	NDS	0.05 mg/m <sup>3</sup>	
Poland	NDSCh	-	
Poland	NDSP		

#### EXPOSURE LIMITS - SWITZERLAND

Source	Type	Value
Remarks: H K		

#### PERSONAL PROTECTIVE EQUIPMENT

Respiratory Protection: Government approved respirator in nonventilated areas and/or for exposure above the TLV or PEL.  
 Hand Protection: Compatible chemical-resistant gloves.  
 Eye Protection: Chemical safety goggles.

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#### 9 - Physical and Chemical Properties

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Appearance	Physical State: Liquid	
Property	Value	At Temperature or Pressure
pH	N/A	
BP/BP Range	230 - 232 °C	740 mmHg
MP/MP Range	7 °C	
Flash Point	144 °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	N/A	
SG/Density	1.03 g/cm <sup>3</sup>	
Partition Coefficient	N/A	
Viscosity	N/A	
Vapor Density	6.18 g/l	
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	N/A	

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#### 10 - Stability and Reactivity

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##### STABILITY

Stable: Stable.

Materials to Avoid: Strong oxidizing agents, Strong acids.

##### HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide, Thermal decomposition may produce toxic fumes of phosphorus oxides and/or phosphine.

##### HAZARDOUS POLYMERIZATION

Hazardous Polymerization: Will not occur

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#### 11 - Toxicological Information

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ACUTE TOXICITY

LD50

Oral

Rat

2650 mg/kg

Remarks: Behavioral:Convulsions or effect on seizure threshold. Kidney, Ureter, Bladder:Hematuria. Kidney, Ureter, Bladder:Incontinence.

LD50

Oral

Mouse

2400 mg/kg

LD50

Intraperitoneal

Mouse

1600 MG/KG

LD50

Intravenous

Mouse

800 MG/KG

LD50

Skin

Rabbit

2600 mg/kg

Remarks: Behavioral:Altered sleep time (including change in righting reflex). Behavioral:Somnolence (general depressed activity). Lungs, Thorax, or Respiration:Dyspnea.

LD50

Oral

Guinea pig

1600 mg/kg

LD50

Skin

Guinea pig

1175 mg/kg

LD50

Oral

Chicken

835 mg/kg

Remarks: Peripheral Nerve and Sensation:Flaccid paralysis without anesthesia (usually neuromuscular blockage).

Behavioral:Ataxia.

LD50

Oral

Quail

1000 mg/kg

IRRITATION DATA

Skin

Guinea pig

0.05 ml

24H

Remarks: Severe irritation effect

#### SIGNS AND SYMPTOMS OF EXPOSURE

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

#### ROUTE OF EXPOSURE

Skin Contact: May cause skin irritation.

Skin Absorption: May be harmful if absorbed through the skin.

Eye Contact: May cause eye irritation.

Inhalation: Material may be irritating to mucous membranes and upper respiratory tract. May be harmful if inhaled.

Ingestion: May be harmful if swallowed.

#### TARGET ORGAN INFORMATION

Kidneys. Lungs. Male reproductive system.

#### CHRONIC EXPOSURE - CARCINOGEN

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

Rat

Route of Application: Inhalation

Exposure Time: 52W

Result: Tumorigenic:Carcinogenic by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors.

Rat

Route of Application: Inhalation

Exposure Time: 35W

Result: Tumorigenic:Carcinogenic by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors.

Rat

Route of Application: Inhalation

Exposure Time: 26W

Result: Tumorigenic:Carcinogenic by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors.

Rat

Route of Application: Inhalation

Exposure Time: 6H/1Y

Result: Tumorigenic:Carcinogenic by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors.

Rat

Route of Application: Inhalation

Exposure Time: 39W

Result: Tumorigenic:Carcinogenic by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors.

Rat

Route of Application: Inhalation

Exposure Time: 6H/26W

Result: Tumorigenic:Carcinogenic by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors.

Rat

Route of Application: Inhalation

Exposure Time: 6H/43W

Result: Tumorigenic:Carcinogenic by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors.

Rat

Route of Application: Inhalation

Exposure Time: 6H/52W

Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors.

Rat

Route of Application: Inhalation

Exposure Time: 6H/26W

Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors.

Rat

Route of Application: Inhalation

Exposure Time: 6H/52W

Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors.

## IARC CARCINOGEN LIST

Rating: Group 2B

### CHRONIC EXPOSURE - MUTAGEN

Result: May alter genetic material.

other insects

200 UG

Parenteral

sperm

Human

80 UG/L

Cell Type: liver

Morphological transformation.

Human

125 MG/L

Cell Type: HeLa cell

Unscheduled DNA synthesis

Human

156 MG/L

Cell Type: fibroblast

Unscheduled DNA synthesis

Human

500 MG/L

Cell Type: lymphocyte

Cytogenetic analysis

Human

5 MMOL/L

Cell Type: leukocyte

Cytogenetic analysis

Rat  
1800 MG/KG  
Intraperitoneal  
Micronucleus test

Rat  
100 MG/L  
Cell Type: liver  
Unscheduled DNA synthesis

Rat  
1 GM/KG  
Cell Type: ovary  
Body fluid assay

Rat  
1800 MG/KG  
Intraperitoneal  
Cytogenetic analysis

Rat  
2 GM/L  
Cell Type: liver  
Sister chromatid exchange

Mouse  
600 MG/KG  
Oral  
Micronucleus test

Mouse  
1280 MG/KG  
Intraperitoneal  
Micronucleus test

Mouse  
3 ML/L (+S9)  
Cell Type: lymphocyte  
Mutation in microorganisms

Mouse  
1 GM/L  
Cell Type: Embryo  
Morphological transformation.

Mouse  
1700 UG/KG  
Intraperitoneal  
Sister chromatid exchange

Mouse  
250 MG/KG  
Intraperitoneal  
12H  
Dominant lethal test

Mouse  
3 GM/L  
Cell Type: lymphocyte  
Mutation in mammalian somatic cells.

Hamster

400 MG/L  
Cell Type: Embryo  
Morphological transformation.

Hamster  
2500 UG/L  
Cell Type: kidney  
Morphological transformation.

Hamster  
2 MG/L  
Cell Type: liver  
Cytogenetic analysis

Hamster  
2 GM/L  
Cell Type: lung  
Cytogenetic analysis

Hamster  
5 GM/L  
Cell Type: ovary  
Sister chromatid exchange

Hamster  
5 MMOL/L  
Cell Type: lung  
Sister chromatid exchange

Hamster  
10 MG/L  
Cell Type: liver  
SLN

#### CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat  
Dose: 2430 MG/KG  
Route of Application: Oral  
Exposure Time: (MULTIGENERATIONS)  
Result: Effects on Fertility: Female fertility index (e.g., # females pregnant per # sperm positive females; # females pregnant per # females mated ).

Species: Rat  
Dose: 2 GM/KG  
Route of Application: Oral  
Exposure Time: (1D MALE)  
Result: Paternal Effects: Testes, epididymis, sperm duct.

Species: Rat  
Dose: 43750 MG/KG  
Route of Application: Intraperitoneal  
Exposure Time: (5W MALE)  
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count).

SWEDISH OE CARCINOGEN: Substances which according to 21§, AFS 2000:3, no use allowed.

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#### 12 - Ecological Information

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## 13 - Disposal Considerations

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### SUBSTANCE DISPOSAL

Contact a licensed professional waste disposal service to dispose of this material. Observe all federal, state, and local environmental regulations.

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## 14 - Transport Information

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### RID/ADR

UN#: 3082  
Class: 9  
PG: III  
Proper Shipping Name: Environmentally hazardous substance, liquid, n.o.s.

### IMDG

UN#: 3082  
Class: 9  
PG: III  
Proper Shipping Name: Environmentally hazardous substance, liquid, n.o.s.  
Marine Pollutant: No  
Severe Marine Pollutant: No  
Technical Name: Required

### IATA

UN#: 3082  
Class: 9  
PG: III  
Proper Shipping Name: Environmentally hazardous substance, liquid, n.o.s.  
Inhalation Packing Group I: No  
Technical Name: Required

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## 15 - Regulatory Information

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### CLASSIFICATION AND LABELING ACCORDING TO EU DIRECTIVES

ANNEX I INDEX NUMBER: 015-106-00-2

INDICATION OF DANGER: T

Toxic.

R-PHRASES: 45 46

May cause cancer. May cause heritable genetic damage.

S-PHRASES: 53 45

Restricted to professional users. Attention - Avoid exposure - obtain special instructions before use. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

### SWITZERLAND

SWISS POISON CLASS: 1\*

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## 16 - Other Information

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### 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

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