

Material Safety Data Sheet

Date Printed: 13/DEC/2004

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Version 1.2

According to 91/155/EEC

1 - Product and Company Information

Product Name ETHYLENE OXIDE CYLINDER WITH 2 L (NET
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Product Number 03902
Company Sigma-Aldrich Pte Ltd
#08-01 Citilink Warehouse
Singapore 118529
Technical Phone # 65 271 1089
Fax 65 271 1571

2 - Composition/Information on Ingredients

Product Name	CAS #	EC no	Annex I Index Number
ETHYLENE OXIDE	75-21-8	200-849-9	603-023-00-X

Formula C2H4O
Molecular Weight 44.05 AMU
Synonyms Aethylenoxid (German) * Amprolene * Anprolene *
Anproline * Dihydrooxirene * Dimethylene oxide *
ENT-26263 * E.O. * 1,2-Epoxyaethan (German) *
Epoxyethane * 1,2-Epoxyethane * Ethene oxide *
Ethox * Ethylenoxide (Dutch) * Ethylene oxide
(ACGIH:OSHA) * Ethylene (oxyde d') (French) *
Etilene (ossido di) (Italian) * ETO * Etylenu
tlenek (Polish) * FEMA No. 2433 * Merpol *
NCI-C50088 * Oxacyclopropane * Oxane *
Oxidoethane * alpha,beta-Oxidoethane * Oxiraan
(Dutch) * Oxiran * Oxirane * Oxirene, dihydro- *
Oxyfume * Oxyfume 12 * RCRA waste number U115 *
Sterilizing gas ethylene oxide 100% * T-Gas

3 - Hazards Identification

SPECIAL INDICATION OF HAZARDS TO HUMANS AND THE ENVIRONMENT
May cause cancer. May cause heritable genetic damage. Extremely
flammable. Also toxic by inhalation. Irritating to eyes,
respiratory system and skin.
Carc. Cat.2 Muta. Cat.2

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.

5 - Fire Fighting Measures

EXTINGUISHING MEDIA

Suitable: Use water spray to cool fire-exposed containers.

SPECIAL RISKS

Specific Hazard(s): Vapor may travel considerable distance to source of ignition and flash back. Emits toxic fumes under fire conditions.

Explosion Hazards: Forms explosive mixtures in air. Vapor may travel considerable distance to source of ignition and flash back. Container explosion may occur 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 and keep personnel upwind. Shut off all sources of ignition. Shut off leak if there is no risk. Use nonsparking tools.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)

Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

ADDITIONAL INFORMATION

Ventilate the spill site thoroughly before reentering.

7 - Handling and Storage

HANDLING

Directions for Safe Handling: Do not breathe vapor. Avoid all contact. Avoid prolonged or repeated exposure.

STORAGE

Conditions of Storage: Keep tightly closed. Keep away from heat, sparks, and open flame. Store in a cool dry place.

8 - Exposure Controls / Personal Protection

ENGINEERING CONTROLS

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

GENERAL HYGIENE MEASURES

Discard contaminated clothing and shoes. 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	1.8 mg/m3 1 ppm

Remarks: K

EXPOSURE LIMITS - GERMANY

Source	Type	Value
TRGS 900	OEL	2 mg/m3 1 ppm

Remarks: 4

Remarks: H, TRK, TRGS 901-17

EXPOSURE LIMITS - NORWAY

Source	Type	Value
	OEL	1 ppm

Remarks: K

EXPOSURE LIMITS - SWEDEN

Source	Type	Value
	LLV (Level)	2 mg/m3 1 ppm

Remarks: H, K

EXPOSURE LIMITS - SWITZERLAND

Source	Type	Value
OEL	OEL	2 mg/m3 1 ppm

Remarks: H K M

EXPOSURE LIMITS - UNITED KINGDOM

Source	Type	Value
OEL	OEL	9.2 mg/m3 5 ppm

PERSONAL PROTECTIVE EQUIPMENT

Eye Protection: Chemical safety goggles.

9 - Physical and Chemical Properties

Appearance	N/A	
Property	Value	At Temperature or Pressure
pH	N/A	
BP/BP Range	10.7 °C	760 mmHg
MP/MP Range	-111 °C	
Flash Point	-20 °C	Method: closed cup
Flammability	N/A	
Autoignition Temp	429 °C	
Oxidizing Properties	N/A	
Explosive Properties	N/A	
Explosion Limits	Lower: 3 % Upper: 99.9 %	
Vapor Pressure	N/A	
SG/Density	0.882 g/cm3	
Partition Coefficient	N/A	
Viscosity	N/A	
Vapor Density	1.52 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	< 0.04 %
Surface Tension	N/A
Conductivity	N/A
Miscellaneous Data	N/A
Solubility	N/A

10 - Stability and Reactivity

STABILITY

Reactions to Avoid: Reacts violently with:

Materials to Avoid: Alcohols, Alkali metals, Ammonia, Oxidizing agents, Chemically active metals, and their salts.

HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide.

11 - Toxicological Information

RTECS NUMBER: KX2450000

ACUTE TOXICITY

LD50
Oral
Rat
72 mg/kg

LC50
Inhalation
Rat
800 ppm
4H

Remarks: Lungs, Thorax, or Respiration:Other changes.
Liver:Other changes. Kidney, Ureter, Bladder:Other changes.

LD50
Subcutaneous
Rat
187 MG/KG

LC50
Inhalation
Mouse
836 ppm
4H

LD50
Intraperitoneal
Mouse
175 MG/KG

LD50
Intravenous
Mouse
290 MG/KG

LC50
Inhalation
Dog

960 ppm

4H

Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Lacrimation. Gastrointestinal:Nausea or vomiting. Gastrointestinal:Hypermotility, diarrhea.

LD50

Intravenous

Dog

330 MG/KG

Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Other. Behavioral:Convulsions or effect on seizure threshold. Gastrointestinal:Nausea or vomiting.

LD50

Oral

Guinea pig

270 mg/kg

LC50

Inhalation

Guinea pig

1,500 mg/m3

4H

IRRITATION DATA

Skin

Human

1 %

7S

Eyes

Rabbit

18 mg

6H

Remarks: Moderate irritation effect

SENSITIZATION

Skin: May cause allergic skin reaction.

SIGNS AND SYMPTOMS OF EXPOSURE

Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Exposure to large amounts can cause: Convulsions.

ROUTE OF EXPOSURE

Multiple Routes: Harmful if swallowed, inhaled, or absorbed through skin. High concentrations are extremely destructive to tissues of the mucous membranes and upper respiratory tract, eyes, and skin.

TARGET ORGAN INFORMATION

Nerves. Lungs.

CHRONIC EXPOSURE - CARCINOGEN

Result: Carcinogen.

Rat

Route of Application: Oral

Exposure Time: 2Y

Result: Tumorigenic:Carcinogenic by RTECS criteria.

Gastrointestinal:Tumors. Liver:Tumors.

Rat

Route of Application: Inhalation

Exposure Time: 6H/2Y

Result: Tumorigenic:Carcinogenic by RTECS criteria. Brain and Coverings:Tumors. Blood:Leukemia

Mouse

Route of Application: Inhalation

Result: Tumorigenic:Carcinogenic by RTECS criteria. Lungs, Thorax, or Respiration:Tumors.

Mouse

Route of Application: Subcutaneous

Exposure Time: 95W

Result: Tumorigenic:Carcinogenic by RTECS criteria.

Blood:Lymphomas including Hodgkin's disease. Tumorigenic:Tumors at site or application.

Mouse

Route of Application: Subcutaneous

Exposure Time: 91W

Result: Tumorigenic:Neoplastic by RTECS criteria.

Blood:Lymphomas including Hodgkin's disease. Tumorigenic:Tumors at site or application.

Mouse

Route of Application: Subcutaneous

Exposure Time: 95W

Result: Tumorigenic:Carcinogenic by RTECS criteria.

Blood:Lymphomas including Hodgkin's disease. Tumorigenic:Tumors at site or application.

Mouse

Route of Application: Subcutaneous

Exposure Time: 95W

Result: Tumorigenic:Carcinogenic by RTECS criteria.

Blood:Lymphomas including Hodgkin's disease. Tumorigenic:Tumors at site or application.

Rat

Route of Application: Oral

Exposure Time: 2Y

Result: Tumorigenic:Carcinogenic by RTECS criteria.

Gastrointestinal:Tumors. Liver:Tumors.

Rat

Route of Application: Inhalation

Exposure Time: 7H/2Y

Result: Tumorigenic:Carcinogenic by RTECS criteria. Blood:Tumors.

Rat

Route of Application: Inhalation

Exposure Time: 6H/2Y

Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Brain and Coverings:Tumors.

Rat

Route of Application: Inhalation

Exposure Time: 6H/2Y

Result: Tumorigenic:Carcinogenic by RTECS criteria. Brain and

Coverings:Tumors.

IARC CARCINOGEN LIST

Rating: Group 1

CHRONIC EXPOSURE - MUTAGEN

Human
5 MMOL/L
Cell Type: fibroblast
DNA damage

Human
4 MMOL/L
Cell Type: leukocyte
Unscheduled DNA synthesis

Human
5 PPM
Inhalation
Y
Cytogenetic analysis

Human
4 PPH
Cell Type: lymphocyte
Sister chromatid exchange

Human
36 PPM
24H
Cell Type: fibroblast
Sister chromatid exchange

Human
10 MG/L
Cell Type: lymphocyte
Sister chromatid exchange

Human
380 PPB/6H/4Y-I
Inhalation
Sister chromatid exchange

Human
60 PPM
Inhalation
12W
Sister chromatid exchange

Human
5 MMOL/L
Cell Type: fibroblast
Mutation in mammalian somatic cells.

Rat
200 MG/KG
Intravenous
Micronucleus test

Rat

200 PPM
Inhalation
6H/4W
Micronucleus test

Rat
30 UG/L
2D
Cell Type: Bone marrow
Cytogenetic analysis

Rat
1 UG/L
Inhalation
17W
Cytogenetic analysis

Rat
9 MG/KG
Oral
Cytogenetic analysis

Rat
50 PPM
Inhalation
6H/3D
Sister chromatid exchange

Rat
1000 PPM
Inhalation
4H
Dominant lethal test

Rat
40 MG/KG
Subcutaneous
Dominant lethal test

Mouse
150 MG/KG
Intraperitoneal
Micronucleus test

Mouse
200 MG/KG
Intravenous
Micronucleus test

Mouse
380 PPM
Inhalation
3H
Micronucleus test

Mouse
2500 UMOL/L
Cell Type: Embryo
Morphological transformation.

Mouse
100 MG/KG

Intraperitoneal
DNA damage

Mouse
1800 PPM
Inhalation
1H
DNA damage

Mouse
300 PPM
Inhalation
Unscheduled DNA synthesis

Mouse
400 PPM
Inhalation
6H
Cytogenetic analysis

Mouse
88120 UG/KG
Intraperitoneal
Cytogenetic analysis

Mouse
88120 UG/KG
Intraperitoneal
Sister chromatid exchange

Mouse
204 PPM
Inhalation
6H/48D
Dominant lethal test

Mouse
150 MG/KG
Intraperitoneal
Dominant lethal test

Mouse
200 MG/KG
Intraperitoneal
3D
Mutation in mammalian somatic cells.

Mouse
5 UMOL/L
Cell Type: lymphocyte
Mutation in mammalian somatic cells.

Mouse
200 PPM
Inhalation
6H/4W
Mutation in mammalian somatic cells.

Mouse
30 MG/KG
Intraperitoneal
25D

Heritable translocation test

Mouse

165 PPM

Inhalation

6H/48D

Heritable translocation test

Hamster

625 PPM

2H

Cell Type: Embryo

Morphological transformation.

Hamster

250 PPM

Cell Type: fibroblast

Cytogenetic analysis

Hamster

5 MG/L

1H

Cell Type: ovary

Mutation in mammalian somatic cells.

Hamster

7500 PPM

2H

Cell Type: lung

Mutation in mammalian somatic cells.

Monkey

100 PPM

Inhalation

7H/2Y

Cytogenetic analysis

Monkey

50 PPM

Inhalation

7H/2Y

Sister chromatid exchange

Rabbit

50 PPM

Inhalation

12W

Sister chromatid exchange

CHRONIC EXPOSURE - TERATOGEN

Species: Rat

Dose: 100 PPM/6H

Route of Application: Inhalation

Exposure Time: (6-15D PREG)

Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Rat

Dose: 150 PPM/7H

Route of Application: Inhalation

Exposure Time: (7-16D PREG)

Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Craniofacial (including nose and tongue). Specific Developmental Abnormalities: Musculoskeletal system.

Species: Mouse
Dose: 255 PPM/6H
Route of Application: Inhalation
Exposure Time: (10D MALE)
Result: Effects on Embryo or Fetus: Fetal death.

Species: Mouse
Dose: 2700 PPM/6H
Route of Application: Inhalation
Exposure Time: (7D PREG)
Result: Effects on Embryo or Fetus: Other effects to embryo.

Species: Mouse
Dose: 150 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (1D MALE)
Result: Effects on Embryo or Fetus: Fetal death.

Species: Mouse
Dose: 125 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (1D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system. Specific Developmental Abnormalities: Other developmental abnormalities.

Species: Mouse
Dose: 450 MG/KG
Route of Application: Intravenous
Exposure Time: (8-10D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system.

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Result: May cause reproductive disorders.

Species: Rat
Dose: 50 PPM/6H
Route of Application: Inhalation
Exposure Time: (91D MALE)
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count).

Species: Rat
Dose: 100 PPM/6H
Route of Application: Inhalation
Exposure Time: (12W MALE/9W PRE-3W PREG)
Result: Effects on Newborn: Live birth index (# fetuses per litter; measured after birth).

Species: Rat
Dose: 3600 UG/M3/24H
Route of Application: Inhalation
Exposure Time: (60D MALE)
Result: Paternal Effects: Testes, epididymis, sperm duct.
Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of

implants per corpora lutea).

Species: Rat
Dose: 100 PPM/6H
Route of Application: Inhalation
Exposure Time: (12W PRE-21D PREG)
Result: Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea). Effects on Newborn: Live birth index (# fetuses per litter; measured after birth).

Species: Mouse
Dose: 1200 PPM/90M
Route of Application: Inhalation
Exposure Time: (1D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).
Effects on Embryo or Fetus: Fetal death. Specific Developmental Abnormalities: Homeostasis

Species: Mouse
Dose: 1200 PPM/90M
Route of Application: Inhalation
Exposure Time: (1D PRE)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).
Effects on Embryo or Fetus: Fetal death. Effects on Embryo or Fetus: Other effects to embryo.

Species: Mouse
Dose: 750 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (25D MALE)
Result: Effects on Newborn: Live birth index (# fetuses per litter; measured after birth). Effects on Newborn: Delayed effects.

Species: Mouse
Dose: 125 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (1D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).
Effects on Fertility: Litter size (e.g.; # fetuses per litter; measured before birth). Specific Developmental Abnormalities: Eye, ear.

Species: Mouse
Dose: 225 MG/KG
Route of Application: Intravenous
Exposure Time: (10-12D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Mouse
Dose: 450 MG/KG
Route of Application: Intravenous
Exposure Time: (10-12D PREG)
Result: Effects on Fertility: Litter size (e.g.; # fetuses per litter; measured before birth). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Monkey
Dose: 50 PPM/7H
Route of Application: Inhalation
Exposure Time: (96W MALE)
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count).

Species: Monkey
Dose: 50 PPM/7H
Route of Application: Inhalation
Exposure Time: (2Y MALE)
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count).

Species: Rabbit
Dose: 324 MG/KG
Route of Application: Intravenous
Exposure Time: (6-14D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).
CMR CAT.: Carc. Cat.2

12 - Ecological Information

No data available.

13 - Disposal Considerations

SUBSTANCE DISPOSAL

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations.

14 - Transport Information

RID/ADR

UN#: 1040
Class: 2
Proper Shipping Name: Ethylene oxide with nitrogen

IMDG

UN#: 1040
Class: 2.3
Subrisk: 2.1
Proper Shipping Name: Ethylene oxide
Marine Pollutant: No
Severe Marine Pollutant: No

IATA

UN#: 1040
Class: 2.3
Subrisk: 2.1
Proper Shipping Name: Ethylene oxide
Inhalation Packing Group I: No

15 - Regulatory Information

CLASSIFICATION AND LABELING ACCORDING TO EU DIRECTIVES

ANNEX I INDEX NUMBER: 603-023-00-X
NOTA: E
INDICATION OF DANGER: F+ T

Extremely Flammable. Toxic.

R-PHRASES: 45 46 12 23 36/37/38

May cause cancer. May cause heritable genetic damage. Extremely flammable. Also toxic by inhalation. Irritating to eyes, respiratory system and skin.

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).

COUNTRY SPECIFIC INFORMATION

Germany

WGK: 2

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.

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