SAFETY DATA SHEET

Version 6.6
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SECTION 1: Identification of the hazardous chemical and of the supplier

1.1 Product identifiers

Product name : Ethylenediamine

Product Number : E26266
Brand : Sigma-Aldrich
CAS-No. : 107-15-3

1.2 Other means of identification

1,2-Diaminoethane

1.3 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : For R&D use only. Not for pharmaceutical, household or other uses.

1.4 Details of the supplier of the safety data sheet

Company : SIGMA-ALDRICH (M) SDN BHD
Level 3, Menara Sunway Annexe,
Jalan Lagoon Timur, Bandar Sunway,
46150 PETALING JAYA, SELANGOR
MALAYSIA

Telephone : +60 (603)03-563-53321
Fax : +60 (603)03-563-54116

1.5 Emergency telephone

Emergency Phone # : 1-800-815-308 (CHEMTREC) * + 62 0800 140 1253 (Customer Call Centre)

Section 2: Hazard identification

2.1 GHS Classification

Classification according to CLASS regulations 2013
Flammable liquids (Category 3), H226
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Dermal (Category 4), H312
Skin corrosion/irritation (Category 1B), H314
Serious eye damage/eye irritation (Category 1), H318
Respiratory sensitization (Category 1), H334
Skin sensitization (Category 1), H317

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Labelling according to CLASS regulations 2013
Pictogram

Signal word	Danger

Hazard statement(s)

H226	Flammable liquid and vapor.
H302 + H312	Harmful if swallowed or in contact with skin.
H314	Causes severe skin burns and eye damage.
H317	May cause an allergic skin reaction.
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Precautionary statement(s)

Prevention

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P285	In case of inadequate ventilation wear respiratory protection.

Response

P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.
P342 + P311	If experiencing respiratory symptoms: Call a POISON CENTER or doctor/ physician.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

2.3 Other hazards

Rapidly absorbed through skin.
Lachrymator.

SECTION 3: Composition and information of the ingredients of the hazardous chemical

Substance / Mixture : Substance

3.1 Substances

Synonyms	:	1,2-Diaminoethane
Formula	:	$C_2H_8N_2$
Molecular weight	:	60.10 g/mol
CAS-No.	:	107-15-3
EC-No.	:	203-468-6
Index-No.	:	612-006-00-6

Hazardous ingredients

Component	Classification	Concentration

ethylenediamine Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)		
	Flam. Liq. 3; Acute Tox. 4; 1B; 1; Resp. Sens. 1; Skin Sens. 1; H226, H302, H312, H314, H318, H334, H317	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Call a physician immediately.

In case of eye contact
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most), avoid vomiting (risk of perforation). Call a physician immediately. Do not attempt to neutralise.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Nitrogen oxides (NOx)
Flash back possible over considerable distance., Container explosion may occur under fire conditions., Vapors may form explosive mixture with air.
Combustible.
Vapors are heavier than air and may spread along floors.
Forms explosive mixtures with air at elevated temperatures.

Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Remove container from danger zone and cool with water. Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition. Keep locked up or in an area accessible only to qualified or authorized persons.

Air and moisture sensitive. Handle and store under inert gas.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls and personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
ethylenediamine	107-15-3	TWA	10 ppm 25 mg/m3	Malaysia. Occupational Safety and Health (Use and Standards of Exposure of Chemicals Hazardous to Health) Regulations 2000.
	Remarks	Skin		

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: butyl-rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Butoject® (KCL 898)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Chloroprene
Minimum layer thickness: 0.65 mm
Break through time: 240 min
Material tested:KCL 720 Camapren®

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
required when vapours/aerosols are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Color: colorless
b)	Odor	amine-like
c)	Odor Threshold	No data available
d)	pH	12.2 at 100 g/l at 20 °C
e)	Melting point/freezing point	Melting point/range: 8.5 °C
f)	Initial boiling point and boiling range	118 °C
g)	Flash point	38 °C - closed cup - DIN 51755 Part 1
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 17 %(V) Lower explosion limit: 2 %(V)
k)	Vapor pressure	12 hPa at 20 °C
l)	Vapor density	2.07 - (Air = 1.0)
m)	Density	0.899 g/mL at 25 °C
	Relative density	No data available
n)	Water solubility	1,000 g/l - miscible
o)	Partition coefficient: n-octanol/water	log Pow: -2.04 - Bioaccumulation is not expected., (Lit.)
p)	Autoignition temperature	405 °C - DIN 51794
q)	Decomposition temperature	> 120 °C -
r)	Viscosity	Viscosity, kinematic: No data available Viscosity, dynamic: 1.265 - 1.725 mPa.s at 25 °C
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Relative vapor density	2.07 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
Vapor/air-mixtures are explosive at intense warming.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .
Absorbs carbon dioxide (CO_2) from air.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Air Exposure to moisture.
Heating.

10.5 Incompatible materials
Aluminum, Lead, magnesium, Zinc, zinc alloys, Copper, Copper alloys, Iron, brass, bronze

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - 866 mg/kg
(OECD Test Guideline 401)
LC50 Inhalation - Rat - male - 4 h - 14.7 mg/l
Remarks: (ECHA)
LD50 Dermal - Rabbit - male - 560 mg/kg
Remarks: (ECHA)

Skin corrosion/irritation
Skin - Rabbit
Result: Corrosive - 15 min
Remarks: (ECHA)
Causes poorly healing wounds.

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Corrosive
Remarks: (ECHA)
Causes serious eye damage.

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: positive
Remarks: (ECHA)
(Regulation (EC) No 1272/2008, Annex VI)
(Regulation (EC) No 1272/2008, Annex VI)

Germ cell mutagenicity
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: positive

Test Type: In vitro mammalian cell gene mutation test
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Result: negative
Remarks: (ECHA)
Test Type: sister chromatid exchange assay
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Result: negative
Remarks: (ECHA)
Test Type: unscheduled DNA synthesis assay
Test system: rat hepatocytes
Metabolic activation: without metabolic activation
Result: negative
Remarks: (ECHA)
Test Type: Mutagenicity (mammal cell test): chromosome aberration.
Test system: Human lymphocytes
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 473
Result: negative
Remarks: (ECHA)

Test Type: dominant lethal test
Species: Rat

Application Route: Oral

Result: negative
Remarks: (ECHA)

Carcinogenicity
No data available

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

Repeated dose toxicity - Mouse - male - Dermal - NOAEL (No observed adverse effect level) - 8.3 mg/kg
Remarks: (ECHA)

Repeated dose toxicity - Rat - male and female - inhalation (vapor) - 6 Weeks - NOAEL (No observed adverse effect level) - 48 mg/kg - LOAEL (Lowest observed adverse effect level) - 107 mg/kg
Remarks: (ECHA)

Repeated dose toxicity - Rat - male and female - Oral - 3 Months - NOAEL (No observed adverse effect level) - 22 mg/kg - LOAEL (Lowest observed adverse effect level) - 114 mg/kg

RTECS: KH8575000
Vomiting, Diarrhea, Abdominal pain
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Liver - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	semi-static test LC50 - Poecilia reticulata (guppy) - 640 mg/l - 96 h (Directive 67/548/EEC, Annex V, C.1.)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - 16.7 mg/l - 48 h (Directive 67/548/EEC, Annex V, C.2.)
Toxicity to algae	static test ErC50 - Pseudokirchneriella subcapitata (algae) - 645 mg/l - 72 h (Directive 67/548/EEC, Annex V, C.3.)
Toxicity to bacteria	static test EC50 - Bacteria - 3.2 mg/l - 2 h Remarks: (ECHA)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 95 % - Readily biodegradable. (Regulation (EC) No. 440/2008, Annex, C.4-E)

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

Avoid release to the environment.

SECTION 13: Disposal information

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions. According to Quality Environment Regulation (Scheduled Waste) 2005, waste need to be

sent to designated premise for recycle, treatment or disposal. Please contact Kualiti Alam for waste classification and correct disposal method.

SECTION 14: Transportation information

14.1 UN number

ADR/RID: 1604 IMDG: 1604 IATA-DGR: 1604

14.2 UN proper shipping name

ADR/RID: ETHYLENEDIAMINE
IMDG: ETHYLENEDIAMINE
IATA-DGR: Ethylenediamine

14.3 Transport hazard class(es)

ADR/RID: 8 (3) IMDG: 8 (3) IATA-DGR: 8 (3)

14.4 Packaging group

ADR/RID: II IMDG: II IATA-DGR: II

14.5 Environmental hazards

ADR/RID: no IMDG Marine pollutant: no IATA-DGR: no

14.6 Special precautions for user

None

14.7 Incompatible materials

Aluminum, Lead, magnesium, Zinc, zinc alloys, Copper, Copper alloys, Iron, brass, bronze

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Notification status

DSL:	All components of this product are on the Canadian DSL
ENCS:	On the inventory, or in compliance with the inventory
ISHL:	On the inventory, or in compliance with the inventory
KECI:	On the inventory, or in compliance with the inventory
NZIoC:	On the inventory, or in compliance with the inventory
PICCS:	On the inventory, or in compliance with the inventory

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

H226	Flammable liquid and vapor.
H302	Harmful if swallowed.
H312	Harmful in contact with skin.
H314	Causes severe skin burns and eye damage.
H317	May cause an allergic skin reaction.
H318	Causes serious eye damage.
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Further information

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

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