

Material Safety Data Sheet



Ethylenediamine, EDA

1. Product and company identification

Product name	: Ethylenediamine, EDA
Synonym	: Ethylenediamine; 1,2-Ethanediamine; Ethylenediamine, >25% in a non hazardous diluent; ETHYLENE DIAMINE; 1,2-Diaminoethane, hydrate
Material uses	: Industrial applications: Intermediate. Chemical synthesis.
CAS number	: 107-15-3
Supplier	: DELAMINE B.V. Barchman Wuytierslaan 10 3818 LH Amersfoort The Netherlands Tel.:31-334676897
Validation date	: 08/04/2014.
In case of emergency	: GBK/Infotrac ID 104075 : (USA domestic) 1 800 535 5053 or international (001) 352 323 3500 (24 hours per day)

2. Hazards identification

Physical state	: Liquid. [Viscous liquid.]
Color	: Colorless.
Odor	: Mild. Ammoniacal.
Emergency overview	
Signal word	: DANGER!
Hazard statements	: COMBUSTIBLE LIQUID AND VAPOR. CAUSES EYE AND SKIN BURNS. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. MAY CAUSE ALLERGIC RESPIRATORY AND SKIN REACTION. MAY BE HARMFUL IF SWALLOWED. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
Precautions	: Keep away from heat, sparks and flame. Do not breathe vapor or mist. Do not ingest. Do not get in eyes or on skin or clothing. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. Wash thoroughly after handling.
OSHA/HCS status	: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Potential acute health effects	
Inhalation	: Toxic by inhalation. May give off gas, vapor or dust that is very irritating or corrosive to the respiratory system. May cause sensitization by inhalation. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
Ingestion	: Harmful if swallowed. May cause burns to mouth, throat and stomach.
Skin	: Corrosive to the skin. Causes burns. Toxic in contact with skin. May cause sensitization by skin contact.
Eyes	: Corrosive to eyes. Causes burns.
Potential chronic health effects	
Chronic effects	: May cause target organ damage, based on animal data. Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.
Carcinogenicity	: No known significant effects or critical hazards.
Mutagenicity	: No known significant effects or critical hazards.
Teratogenicity	: No known significant effects or critical hazards.

2. Hazards identification

- Developmental effects** : No known significant effects or critical hazards.
- Fertility effects** : No known significant effects or critical hazards.
- Target organs** : May cause damage to the following organs: kidneys, liver, upper respiratory tract, skin, eyes.
Contains material which may cause damage to the following organs: blood, lungs.

Over-exposure signs/symptoms

- Inhalation** : Adverse symptoms may include the following:
wheezing and breathing difficulties
asthma
- Ingestion** : Adverse symptoms may include the following:
stomach pains
- Skin** : Adverse symptoms may include the following:
pain or irritation
redness
blistering may occur
- Eyes** : Adverse symptoms may include the following:
pain
watering
redness
- Medical conditions aggravated by over-exposure** : Pre-existing respiratory and skin disorders and disorders involving any other target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

3. Composition/information on ingredients

Name	CAS number	%
1,2-Diaminoethane	107-15-3	100

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4. First aid measures

- Eye contact** : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.
- Skin contact** : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
- Inhalation** : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
- Ingestion** : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

4. First aid measures

- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.
- Notes to physician** : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

5. Fire-fighting measures

- Flammability of the product** : Combustible liquid. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back.
- Extinguishing media**
- Suitable** : Use dry chemical, CO₂, water spray (fog) or foam. Dry sand or other suitable absorbent.
- Not suitable** : Do not use water jet. Halones
- Special exposure hazards** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
- Hazardous thermal decomposition products** : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6. Accidental release measures

- Personal precautions** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).
- Methods for cleaning up**
- Small spill** : Stop leak if without risk. Move containers from spill area. Absorb with an inert material and place in an appropriate waste disposal container. Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

7. Handling and storage

Handling

: Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Persons with a history of skin sensitization problems or asthma, allergies or chronic or recurrent respiratory disease should not be employed in any process in which this product is used. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Keep away from acids. Empty containers retain product residue and can be hazardous. Do not reuse container.

Storage

: Store between the following temperatures: 11 to 50°C (51.8 to 122°F). Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Eliminate all ignition sources. Separate from acids. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

8. Exposure controls/personal protection

United States

Ingredient	Exposure limits
1,2-Diaminoethane	<p>ACGIH TLV (United States, 6/2013). Absorbed through skin. TWA: 10 ppm 8 hours.</p> <p>OSHA PEL 1989 (United States, 3/1989). TWA: 10 ppm 8 hours. TWA: 25 mg/m³ 8 hours.</p> <p>NIOSH REL (United States, 4/2013). TWA: 10 ppm 10 hours. TWA: 25 mg/m³ 10 hours.</p> <p>OSHA PEL (United States, 2/2013). TWA: 10 ppm 8 hours. TWA: 25 mg/m³ 8 hours.</p>

Recommended monitoring procedures

: If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to appropriate monitoring standards. Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

Engineering measures

: Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

8. Exposure controls/personal protection

- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.
- Personal protection**
- Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. Recommended: ammonia filter (Type K) ammonia (Type K) and particulate filter
- Hands** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated. > 8 hours (breakthrough time): neoprene
- Eyes** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles and/or face shield. If inhalation hazards exist, a full-face respirator may be required instead.
- Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9. Physical and chemical properties

- Physical state** : Liquid. [Viscous liquid.]
- Flash point** : Closed cup: 38 to 42°C (100.4 to 107.6°F)
- Auto-ignition temperature** : 385 to 405°C (725 to 761°F)
- Flammable limits** : Lower: 2.7%
Upper: 16.6%
- Color** : Colorless.
- Odor** : Mild. Ammoniacal.
- Molecular formula** : C₂H₈N₂
- pH** : 12 [Conc. (% w/w): 1%]
- Boiling/condensation point** : 117°C (242.6°F)
- Melting/freezing point** : 10.8 to 11°C (51.4 to 51.8°F)
- Density** : 0.897 g/cm³ [20°C (68°F)]
- Vapor pressure** : 1.3 kPa (9.7508 mm Hg) [room temperature]
- Vapor density** : 2.07 [Air = 1]
- VOC content** : 7.49 lbs/gal (897 g/l)

9. Physical and chemical properties

Evaporation rate	: 0.91 (butyl acetate = 1)
Viscosity	: Dynamic (room temperature): 1.265 mPa·s (1.265 cP)
Water solubility (g/l)	: 1000 g/l
LogK_{ow}	: -2 to -1.3

10. Stability and reactivity

Chemical stability	: The product is stable.
Conditions to avoid	: Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas. aerosol or mist formation
Incompatible materials	: R eactive or incompatible with the following materials: oxidizing materials, metals and acids. Chlorinated hydrocarbon. Reactive or incompatible with the following materials: acids oxidizing materials
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Possibility of hazardous reactions	: Under normal conditions of storage and use, hazardous reactions will not occur. Under normal conditions of storage and use, hazardous polymerization will not occur.

11. Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
1,2-Diaminoethane	LC50 Inhalation Vapor	Rat	14700 mg/m ³	4 hours
	LD50 Dermal	Rat	560 mg/kg	-
	LD50 Oral	Rat	866 mg/kg	-

Conclusion/Summary : No additional information.

Chronic toxicity

Product/ingredient name	Result	Species	Dose	Exposure
1,2-Diaminoethane	Sub-chronic NOAEL Oral	Rat	22 mg/kg	-
	Sub-acute NOAEL Inhalation Vapor	Rat - Male, Female	144 mg/m ³	6 weeks

Conclusion/Summary : Cannot be classified.

Irritation/Corrosion

Not available.

Conclusion/Summary : Not available.

Skin : Corrosive to the skin.

Eyes : Corrosive to eyes.

Respiratory : No additional information.

Sensitizer

11. Toxicological information

Product/ingredient name	Route of exposure	Species	Result
1,2-Diaminoethane	skin	Guinea pig	Sensitizing

- Conclusion/Summary** : Not available.
- Skin** : May cause skin sensitization.
- Respiratory** : May cause sensitization by inhalation.

Carcinogenicity

- Conclusion/Summary** : Oral : Cannot be classified. NOAEL= 159 mg/kg bw/day
Dermal: Cannot be classified. NOAEL= 8 mg/kg bw/day

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
1,2-Diaminoethane	A4	-	-	-	-	-

Mutagenicity

Product/ingredient name	Test	Experiment	Result
1,2-Diaminoethane	-	Experiment: In vivo Subject: Mammalian-Animal Cell: Germ	Negative

- Conclusion/Summary** : No mutagenic effect.

Teratogenicity

Not available.

- Conclusion/Summary** : Cannot be classified.

Reproductive toxicity

Not available.

- Conclusion/Summary** : Fertility Cannot be classified. NOAEL Oral= 500 mg/kg bw/day
Developmental Toxicity: Cannot be classified. NOAEL Oral= 250 mg/kg bw/day

12. Ecological information

Aquatic ecotoxicity

Product/ingredient name	Result	Species	Exposure
1,2-Diaminoethane	EC50 3.2 mg/l NOEC 0.5 mg/l Acute EC50 645 mg/l Fresh water Acute EC50 16.7 mg/l Fresh water Acute LC50 640 mg/l Fresh water Acute NOEC 3.2 mg/l Fresh water Chronic NOEC 0.16 mg/l Fresh water Chronic NOEC 10 mg/l Fresh water	Micro-organism Micro-organism Algae Daphnia Fish Algae Daphnia Fish	2 hours 2 hours 72 hours 48 hours 96 hours 72 hours 21 days 28 days

- Conclusion/Summary** : Not classified as dangerous
PNEC Intermittent release.= 0.167 mg/l

Persistence/degradability

12. Ecological information

Product/ingredient name	Test	Result	Dose	Inoculum
1,2-Diaminoethane	-	95 % - 28 days	-	-
	-	88 % - 15 days	-	-
	-	10 % - 5 days	-	-

Conclusion/Summary : This substance is not expected to bioaccumulate through food chains in the environment. Readily biodegradable. not persistent. Not toxic.

Partition coefficient: n-octanol/water : -2 to -1.3

Bioconcentration factor : <2000

Mobility : No specific data.

Other adverse effects : No known significant effects or critical hazards.

13. Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.







Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14. Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information

14. Transport information

DOT Classification	UN1604	Ethylenediamine RQ	8 (3)	II	 	<p>Reportable quantity 5000 lbs / 2270 kg [668.53 gal / 2530.7 L] Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.</p> <p>Limited quantity Yes.</p> <p>Packaging instruction Passenger aircraft Quantity limitation: 1 L</p> <p>Cargo aircraft Quantity limitation: 30 L</p> <p>Special provisions IB2, T7, TP2</p>
IMDG Class	UN1604	ETHYLENEDIAMINE	8 (3)	II	 	<p>Emergency schedules (EmS) F-E, S-C</p>
IATA-DGR Class	UN1604	Ethylenediamine	8 (3)	II	 	<p>Passenger and Cargo AircraftQuantity limitation: 1 L Packaging instructions: 851</p> <p>Cargo Aircraft Only Quantity limitation: 30 L Packaging instructions: 855</p> <p>Limited Quantities - Passenger AircraftQuantity limitation: 0.5 L Packaging instructions: Y840</p>

PG* : Packing group

15. Regulatory information

- HCS Classification** : Combustible liquid
Toxic material
Corrosive material
Sensitizing material
Target organ effects
- U.S. Federal regulations** : **TSCA 8(a) CDR Exempt/Partial exemption:** Not determined
United States inventory (TSCA 8b): All components are listed or exempted.
 SARA 302/304: 1,2-Diaminoethane
SARA 311/312 Hazards identification: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard
Clean Water Act (CWA) 311: 1,2-Diaminoethane
Clean Air Act (CAA) 112 accidental release prevention: No products were found.

15. Regulatory information

Clean Air Act (CAA) 112 regulated toxic substances: 1,2-Diaminoethane

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 313

Form R - Reporting requirements : Not applicable.

Supplier notification : Not applicable.

State regulations

Massachusetts : The following components are listed: ETHYLENEDIAMINE

New York : The following components are listed: Ethylenediamine

New Jersey : The following components are listed: ETHYLENEDIAMINE; 1,2-ETHANEDIAMINE

Pennsylvania : The following components are listed: 1,2-ETHANEDIAMINE

California Prop. 65

None of the components are listed.

United States inventory (TSCA 8b) : All components are listed or exempted.

Canada inventory : All components are listed or exempted.

International regulations

International lists :

- Australia inventory (AICS)**: All components are listed or exempted.
- China inventory (IECSC)**: All components are listed or exempted.
- Japan inventory**: All components are listed or exempted.
- Korea inventory**: All components are listed or exempted.
- Malaysia Inventory (EHS Register)**: All components are listed or exempted.
- New Zealand Inventory of Chemicals (NZIoC)**: All components are listed or exempted.
- Philippines inventory (PICCS)**: All components are listed or exempted.
- Taiwan inventory (CSNN)**: All components are listed or exempted.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

16. Other information

Label requirements : COMBUSTIBLE LIQUID AND VAPOR. CAUSES EYE AND SKIN BURNS. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. MAY CAUSE ALLERGIC RESPIRATORY AND SKIN REACTION. MAY BE HARMFUL IF SWALLOWED. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.

Hazardous Material Information System (U.S.A.) :

Health	*	3
Flammability		2
Physical hazards		0

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on MSDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.) :



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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Date of issue : 08/04/2014.

Date of previous issue : 07/09/2012.

Version : 7

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.