Material Safety Data Sheet

Diethylenetriamine, DETA

1. Product and company identification

Product name : Diethylenetriamine, DETA

Synonym : Diethylenetriamine; 2,2'-iminodi(ethylamine); 1,2-Ethanediamine, N1-(2-aminoethyl)-; Diethylenetriamine (DETA); Diethylenetriamine-1,2-Ethanediamine, N-(2-aminoethyl)-; 1, 2-Ethanediamine, N-(2-aminoethyl)-; diethylene triamine; N-(2-Aminoethyl)-1, 2-ethanediamine; 1,4,7-tri-(aza)-heptane; 2,2'-Diaminodiethylamine

Material uses : Industrial applications: Intermediate.

CAS number : 111-40-0

Supplier : DELAMINE B.V.
Barchman Wuytierslaan 10
3818 LH Amersfoort
The Netherlands
Tel.:31-334676897

Validation date : 07/09/2012.

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. Yellow.

Odor : Ammoniacal.

Emergency overview

Signal word : DANGER!

Hazard statements : MAY BE FATAL IF INHALED. CAUSES EYE AND SKIN BURNS. CAUSES RESPIRATORY TRACT IRRITATION. MAY CAUSE ALLERGIC SKIN REACTION. MAY BE HARMFUL IF ABSORBED THROUGH SKIN OR IF SWALLOWED. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.

Precautions : 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).

Routes of entry : Dermal contact. Ingestion.

Potential acute health effects

Inhalation : Very toxic by inhalation. Irritating to respiratory system. 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. Harmful 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.

2. Hazards identification

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

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: gastrointestinal tract, upper respiratory tract, skin, eyes.
Contains material which may cause damage to the following organs: eye, lens or cornea.

Over-exposure signs/symptoms

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

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 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	%
2,2'-iminodiethylamine	111-40-0	60-100

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 : Call medical doctor or poison control center immediately. 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 : In a fire or if heated, a pressure increase will occur and the container may burst.

Extinguishing media

Suitable : Use an extinguishing agent suitable for the surrounding fire.Dry sand or other suitable absorbent. Use dry chemical, CO_2, water spray (fog) or foam.

Not suitable : 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.

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. 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. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. 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 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. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Keep away from acids. Empty containers retain product residue and can be hazardous. Do not reuse container.

Storage : Do not store above the following temperature: 40°C (104°F). Store in accordance with local regulations. 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. Separate from acids. 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
2,2'-iminodiethylamine	**ACGIH TLV (United States, 1/2011). Absorbed through skin.** TWA: 1 ppm 8 hours. TWA: 4.2 mg/m³ 8 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 1 ppm 8 hours. TWA: 4 mg/m³ 8 hours. **NIOSH REL (United States, 6/2009). Absorbed through skin.** TWA: 1 ppm 10 hours. TWA: 4 mg/m³ 10 hours.

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.

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

8. Exposure controls/personal protection

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: 96.7°C (206.1°F)

Auto-ignition temperature : 358°C (676.4°F)

Color : Colorless. Yellow.

Odor : Ammoniacal.

Molecular formula : C4-H13-N3

pH : 11.6 [Conc. (% w/w): 1%]

Boiling/condensation point : 207°C (404.6°F)

Melting/freezing point : -39°C (-38.2°F)

Relative density : 0.9586

Vapor pressure : 0.021 kPa (0.15976 mm Hg) [room temperature]

Vapor density : 3.56 [Air = 1]

VOC content : 8 lbs/gal (958.6 g/l)

Viscosity : Dynamic (room temperature): 5.05 mPa·s (5.05 cP)

Solubility :

Miscible in water.

$LogK_{ow}$: -1.58

10. Stability and reactivity

Chemical stability : The product is stable.

Conditions to avoid : Keep away from sources of ignition - No smoking. aerosol or mist formation

Incompatible materials : Reactive or incompatible with the following materials: oxidizing materials, metals and acids.
Chlorinated hydrocarbon.

10. Stability and reactivity

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
2,2'-iminodiethylamine	LD50 Dermal LD50 Oral	Rabbit Rat	1090 mg/kg 1620 mg/kg	- -

Conclusion/Summary : Inhalation (Aerosol. Rat, 8 hours) : LD0= 0.07 mg/l; LD100= 0.30 mg/l

Chronic toxicity

Product/ingredient name	Result	Species	Dose	Exposure
2,2'-iminodiethylamine	Chronic NOAEL Oral Chronic NOAEL Dermal Sub-chronic NOAEL Inhalation Vapor	Rat Rat Rat	70 mg/kg 114 mg/kg 550 mg/m³	- - 6 hours

Conclusion/Summary : Cannot be classified.

Irritation/Corrosion

Not available.

Conclusion/Summary : Not available.

Skin : Corrosive to the skin.

Eyes : Highly corrosive.

Respiratory : May cause respiratory irritation.

Sensitizer

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

Conclusion/Summary : Not available.

Skin : May cause skin sensitization.

Respiratory : Non-sensitizer to lungs. Not classified for respiratory sensitization.

Carcinogenicity

Conclusion/Summary : Dermal No carcinogenic effect. Not classified as dangerous NOAEL = 56.3mg/kg bw/day
Oral No data available for this end-point, hence this classification is not considered to be applicable.
Inhalation No data available for this end-point, hence this classification is not considered to be applicable.

Classification

Not available.

Mutagenicity

Not available.

11. Toxicological information

Conclusion/Summary : Not mutagenic in a standard battery of genetic toxicological tests.

Teratogenicity

Not available.

Conclusion/Summary : No known significant effects or critical hazards.

Reproductive toxicity

Product/ingredient name	Maternal toxicity	Fertility	Development toxin	Species	Dose	Exposure
2,2'-iminodiethylamine	-	Equivocal	Equivocal	Rat	Oral	90 days

Conclusion/Summary : Fertility NOAEL = 30mg/kg bw/day
Developmental Toxicity: NOAEL = 30mg/kg bw/day
Data inconclusive.
Not fully tested.
Not classified.
Further studies (REACH Annex IX/ X) have been proposed

12. Ecological information

Ecotoxicity : Readily biodegradable This product shows a low bioaccumulation potential.

Aquatic ecotoxicity

Product/ingredient name	Result	Species	Exposure
2,2'-iminodiethylamine	EC50 32.7 mg/l NOEC 6 mg/l Acute EC50 1164 mg/l Fresh water Acute EC50 32 mg/l Fresh water Acute LC50 430 mg/l Fresh water Chronic NOEC 5.6 mg/l Fresh water Chronic NOEC 10 mg/l Fresh water	Micro-organism Micro-organism Algae Daphnia Fish Daphnia Fish	3 hours 3 hours 72 hours 48 hours 96 hours 21 days 28 days

Conclusion/Summary : Not classified as dangerous
PNEC Intermittent release.= 0.32 mg/l

Persistence/degradability

Product/ingredient name	Test	Result	Dose	Inoculum
2,2'-iminodiethylamine	-	87 % - Readily - 21 days	-	-

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

Partition coefficient: n-octanol/water : -1.58

Bioconcentration factor : 0.3 to 6.3

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. 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
DOT Classification	UN2079	Diethylenetriamine	8	II		**Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: 1 L **Cargo aircraft** Quantity limitation: 30 L **Special provisions** B2, IB2, T7, TP2, T3
IMDG Class	UN2079	DIETHYLENETRIAMINE	8	II		**Emergency schedules (EmS)** F-A, S-B
IATA-DGR Class	UN2079	Diethylenetriamine	8	II		**Passenger and Cargo Aircraft**Quantity limitation: 1 L Packaging instructions: 851 **Cargo Aircraft Only** Quantity limitation: 30 L Packaging instructions: 855 **Limited Quantities - Passenger Aircraft**Quantity limitation: 0.5 L Packaging instructions: Y840

PG* : Packing group

15. Regulatory information

HCS Classification : Highly toxic material
Corrosive material
Sensitizing material
Target organ effects

U.S. Federal regulations : **TSCA 8(a) IUR Exempt/Partial exemption**: Not determined
United States inventory (TSCA 8b): All components are listed or exempted.

SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: 2,2'-iminodiethylamine
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: 2,2'-iminodiethylamine: Immediate (acute) health hazard, Delayed (chronic) health hazard

Clean Air Act (CAA) 112 accidental release prevention: No products were found.

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: DIETHYLENE TRIAMINE

New York : None of the components are listed.

New Jersey : The following components are listed: DIETHYLENE TRIAMINE; 1,2-ETHANEDIAMINE, N-(2-AMINOETHYL)-

Pennsylvania : The following components are listed: 1,2-ETHANEDIAMINE, N-(2-AMINOETHYL)-

California Prop. 65

Not available.

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

Canada inventory : All components are listed or exempted.

International regulations

15. Regulatory information

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): Not determined.
New Zealand Inventory of Chemicals (NZIoC): All components are listed or exempted.
Philippines inventory (PICCS): All components are listed or exempted.
Taiwan inventory (CSNN): Not determined.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

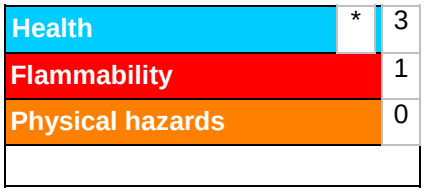
Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

16. Other information

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

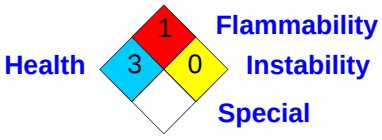
Hazardous Material Information System (U.S.A.) :



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.) :



16. Other information

Date of issue : 07/09/2012.

Date of previous issue : 29/09/2011.

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.