SAFETY DATA SHEET

EPIBOND® 1590 B US

Section 1. Identification

GHS product identifier : **EPIBOND® 1590 B US**

Product code : 00052770

Other means of identification : Not available.

Product type : Liquid.

Material uses : Hardener for adhesive systems

Supplier's details : Huntsman Advanced Materials Americas LLC
P.O. Box 4980
The Woodlands, TX 77387

Non-Emergency phone: (800) 257-5547

e-mail address of person responsible for this SDS : MSDS@huntsman.com

Emergency telephone number (24h/7day) : Chemtrec: (800) 424-9300 or (703) 527-3887

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : ACUTE TOXICITY (oral) - Category 4
SKIN CORROSION/IRRITATION - Category 1B
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 1
SKIN SENSITIZATION - Category 1
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2
AQUATIC HAZARD (ACUTE) - Category 3
AQUATIC HAZARD (LONG-TERM) - Category 2

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Harmful if swallowed.
Causes severe skin burns and eye damage.
May cause an allergic skin reaction.
May cause damage to organs through prolonged or repeated exposure.
Toxic to aquatic life with long lasting effects.

Section 2. Hazards identification

Precautionary statements : Wear protective gloves: > 8 hours (breakthrough time): Ethyl Vinyl Alcohol Laminate (EVAL), butyl rubber. Wear eye or face protection. Wear protective clothing. Avoid release to the environment. Do not breathe vapor. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Contaminated work clothing should not be allowed out of the workplace. Collect spillage. Get medical attention if you feel unwell. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or physician. IF SWALLOWED: Immediately call a POISON CENTER or physician. Rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. Wash contaminated clothing before reuse. Immediately call a POISON CENTER or physician. IF ON SKIN: Wash with plenty of soap and water. If skin irritation or rash occurs: Get medical attention. 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 physician. Store locked up. Dispose of contents and container in accordance with all local, regional, national and international regulations.

Other hazards which do not result in classification : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	%	CAS number
2-propenenitrile polymer with 1,3-butadiene, 1-cyano-1-methyl-4-oxo-4-[[2-(1-piperazinyl)ethyl]amino]butyl-terminated	30 - 60	68683-29-4
Tetraethylenepentamine	13 - 30	112-57-2
Aminoethylpiperazine	7 - 13	140-31-8
polymeric cycloaliphatic amines	7 - 13	135108-88-2
Cycloaliphatic polyamine	7 - 13	1761-71-3
2,4,6-tris(dimethylaminomethyl)phenol	1 - 3	90-72-2
3-aminopropyltriethoxysilane	0.1 - 1	919-30-2
3-mercaptopropyltrimethoxysilane	0.1 - 1	4420-74-0

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician.

Inhalation : Get medical attention immediately. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. 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.

Skin contact :

Section 4. First aid measures

Get medical attention immediately. Call a poison center or physician. Wash with plenty of soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Chemical burns must be treated promptly by a physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye damage.

Inhalation : May give off gas, vapor or dust that is very irritating or corrosive to the respiratory system. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Skin contact : Causes severe burns. May cause an allergic skin reaction.

Ingestion : Harmful if swallowed. May cause burns to mouth, throat and stomach.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
pain
watering
redness

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:
pain or irritation
redness
blistering may occur

Ingestion : Adverse symptoms may include the following:
stomach pains

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Symptomatic and supportive therapy as needed. Following severe exposure medical follow-up should be monitored for at least 48 hours.

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.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Flash point : Closed cup: >100°C (>212°F) [DIN 51758 EN 22719 (Pensky-Martens Closed Cup)]

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : In a fire or if heated, a pressure increase will occur and the container may burst. This material is toxic to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides
metal oxide/oxides

Special protective actions for fire-fighters : 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.

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.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : 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.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

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). Water polluting material. May be harmful to the environment if released in large quantities. Collect spillage.

Methods and materials for containment and cleaning up : 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.

Section 6. Accidental release measures

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). 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. Avoid release to the environment. If during normal use the material presents a respiratory hazard, use only with adequate ventilation or wear appropriate respirator. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : 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. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store between the following temperatures: 2 to 8°C (35.6 to 46.4°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. Store locked up. 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.

Section 8. Exposure controls/personal protection

Control parameters

Appropriate engineering controls : If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

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.

Individual protection measures

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.

Eye/face protection : 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, gases 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.

Section 8. Exposure controls/personal protection

Hand protection : 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): Ethyl Vinyl Alcohol Laminate (EVAL), butyl rubber

Body protection : 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.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : 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.

Thermal hazards : Not available.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid.

Color : Amber.

Odor : Ammoniacal.

Odor threshold : Not available.

pH : Not available.

Melting point/Freezing point : Not available.

Boiling/condensation point : Not available.

Flash point : Closed cup: >100°C (>212°F) [DIN 51758 EN 22719 (Pensky-Martens Closed Cup)]

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : <0.1 kPa (<0.75 mm Hg) [room temperature]

Vapor density : Not available.

Relative density : 0.95

Solubility in water : partially soluble

Partition coefficient: n-octanol/water : Not available.

Auto-ignition temperature : Not available.

Decomposition temperature : >200°C (>392°F)

Density : 0.95 to 1.1 g/cm³ [25°C (77°F)]

Viscosity : Dynamic (room temperature): 40000 to 100000 mPa·s (40000 to 100000 cP)

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Incompatible materials : No specific data.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Test	Endpoint	Species	Result
2-propenenitrile polymer with 1,3-butadiene, 1-cyano-1-methyl-4-oxo-4-[[2-(1-piperazinyl)ethyl]amino] butyl-terminated	Unknown guidelines	LD50 Dermal	Rabbit	>3 g/kg
	Unknown guidelines	LD50 Oral	Rat	>15.4 g/kg
Tetraethylenepentamine	OECD 402 Acute Dermal Toxicity	LD50 Dermal	Rabbit - Male, Female	1260 mg/kg
	OECD 401 Acute Oral Toxicity	LD50 Oral	Rat - Male, Female	1716.2 mg/kg
	No official guidelines	LD50 Oral	Rat - Male	3250 mg/kg
Aminoethylpiperazine	No official guidelines	LD50 Dermal	Rabbit	866 mg/kg
	No official guidelines	LD50 Oral	Rabbit - Male	2097 mg/kg
Cycloaliphatic polyamine	EPA OPPTS	LD50 Dermal	Rabbit - Male, Female	2110 mg/kg
	EPA OPPTS	LD50 Oral	Rat - Male, Female	380 mg/kg
2,4,6-tris (dimethylaminomethyl) phenol	Unknown guidelines	LD50 Dermal	Rat - Male	>971 mg/kg
	OECD 401 Acute Oral Toxicity	LD50 Oral	Rat - Male, Female	2169 mg/kg
3-aminopropyltriethoxysilane	OECD 403 Acute Inhalation Toxicity	LC50 Inhalation Vapor	Rat - Male	>5 ppm
	EPA OPPTS EPA OTS 798.1100	LD50 Dermal	Rabbit - Male, Female	4075 mg/kg
	EPA OPPTS EPA OTS 798.1175	LD50 Oral	Rat - Male, Female	1491 to 2688 mg/kg
3-mercaptopropyltrimethoxysilane	-	LD50 Dermal	Rabbit	2.14 ml/kg
	-	LD50 Oral	Rat	0.73 ml/kg

Irritation/Corrosion

Section 11. Toxicological information

Product/ingredient name	Test	Species	Result
2-propenenitrile polymer with 1, 3-butadiene, 1-cyano-1-methyl-4-oxo-4-[[2-(1-piperazinyl)ethyl] amino]butyl-terminated	Unknown guidelines	Rabbit	Eyes - Mild irritant
	Unknown guidelines	Rabbit	Skin - Moderate irritant
Tetraethylenepentamine	OECD 404 Acute Dermal Irritation/Corrosion	Rabbit	Skin - Corrosive
	Unknown guidelines	Rabbit	Eyes - Corrosive
Aminoethylpiperazine	No official guidelines	Rabbit	Skin - Corrosive
	No official guidelines	Rabbit	Eyes - Severe irritant
Cycloaliphatic polyamine	-	Rabbit	Skin - Corrosive
2,4,6-tris(dimethylaminomethyl) phenol	OECD 404 Acute Dermal Irritation/Corrosion	Rabbit	Skin - Corrosive
	EPA CFR	Rabbit	Eyes - Corrosive
3-aminopropyltriethoxysilane	OECD 404 Acute Dermal Irritation/Corrosion	Rabbit	Skin - Corrosive
	OECD 405 Acute Eye Irritation/ Corrosion	Rabbit	Eyes - Corrosive
3-mercaptopropyltrimethoxysilane	-	Rabbit	Skin - Mild irritant

Conclusion/Summary

Skin :

2-propenenitrile polymer with 1,3-butadiene, 1-cyano-1-methyl-4-oxo-4-[[2-(1-piperazinyl)ethyl] amino]butyl-terminated	Irritating to skin.
Tetraethylenepentamine	Corrosive to the skin.
Aminoethylpiperazine	Corrosive to eyes and skin.
polymeric cycloaliphatic amines	No additional information.
Cycloaliphatic polyamine	Corrosive to the skin.
2,4,6-tris (dimethylaminomethyl) phenol	Corrosive to the skin.
3-aminopropyltriethoxysilane	Corrosive to the skin.
3-mercaptopropyltrimethoxysilane	Slightly irritating to the skin.

Eyes :

2-propenenitrile polymer with 1,3-butadiene, 1-cyano-1-methyl-4-oxo-4-[[2-(1-piperazinyl)ethyl] amino]butyl-terminated	Slightly irritating to the eyes.
Tetraethylenepentamine	Corrosive to eyes.
Aminoethylpiperazine	Corrosive to eyes and skin.
polymeric cycloaliphatic amines	No additional information.
Cycloaliphatic polyamine	No additional information.
2,4,6-tris (dimethylaminomethyl) phenol	Corrosive to eyes.
3-aminopropyltriethoxysilane	Corrosive to eyes.
3-mercaptopropyltrimethoxysilane	No additional information.

Respiratory :

Section 11. Toxicological information

2-propenenitrile polymer with 1,3-butadiene, 1-cyano-1-methyl-4-oxo-4-[[2-(1-piperazinyl)ethyl]amino]butyl-terminated	No additional information.
Tetraethylenepentamine	No additional information.
Aminoethylpiperazine	No additional information.
polymeric cycloaliphatic amines	No additional information.
Cycloaliphatic polyamine	No additional information.
2,4,6-tris (dimethylaminomethyl) phenol	No additional information.
3-aminopropyltriethoxysilane	No additional information.
3-mercaptopropyltrimethoxysilane	No additional information.

Sensitization

Product/ingredient name	Test	Route of exposure	Species	Result
2-propenenitrile polymer with 1,3-butadiene, 1-cyano-1-methyl-4-oxo-4-[[2-(1-piperazinyl)ethyl]amino] butyl-terminated	-	skin	Guinea pig	Sensitizing
Tetraethylenepentamine	-	skin	Guinea pig	Sensitizing
Aminoethylpiperazine	-	skin	Guinea pig	Sensitizing
2,4,6-tris (dimethylaminomethyl) phenol	-	skin	Guinea pig	Not sensitizing
3-aminopropyltriethoxysilane	-	skin	Guinea pig	Sensitizing

Mutagenicity

Product/ingredient name	Test	Result
Tetraethylenepentamine	Experiment: In vitro Subject: Bacteria Metabolic activation: +/-	Positive
	Experiment: In vitro Subject: Mammalian-Animal Metabolic activation: +/-	Positive
	Experiment: In vitro Subject: Mammalian-Animal	Negative
	Experiment: In vivo Subject: Mammalian-Animal	Negative
Aminoethylpiperazine	Experiment: In vitro Subject: Bacteria Metabolic activation: +/-	Negative
	Experiment: In vitro Subject: Mammalian-Animal Metabolic activation: +/-	Negative
	Experiment: In vitro Subject: Mammalian-Animal Cell: Somatic	Negative
	Experiment: In vivo Subject: Mammalian-Animal	Negative
Cycloaliphatic polyamine	Experiment: In vitro	Negative

Section 11. Toxicological information

	Subject: Bacteria Metabolic activation: +/- Experiment: In vitro Subject: Mammalian-Animal Metabolic activation: +/- Experiment: In vitro Subject: Mammalian-Animal Metabolic activation: +/- Experiment: In vivo Subject: Mammalian-Animal Cell: Somatic	Negative Negative Negative
2,4,6-tris (dimethylaminomethyl)phenol	Experiment: In vitro Subject: Bacteria Metabolic activation: +/- Experiment: In vitro Subject: Mammalian-Animal Cell: Somatic Metabolic activation: +/- Experiment: In vitro Subject: Mammalian-Human Cell: Somatic Metabolic activation: +/-	Negative Negative Negative
3-aminopropyltriethoxysilane	Experiment: In vivo Subject: Mammalian-Animal	Negative

Conclusion/Summary :

Aminoethylpiperazine	Not mutagenic in a standard battery of genetic toxicological tests.
2,4,6-tris (dimethylaminomethyl) phenol	Not mutagenic in a standard battery of genetic toxicological tests.
3-aminopropyltriethoxysilane	The weight of the scientific evidence indicates that this material is non-genotoxic.

Carcinogenicity

Product/ingredient name	Test	Species	Dose	Exposure	Result/Result type
Tetraethylenepentamine	OECD 451 Carcinogenicity Studies	Mouse - Male	>=42 mg/kg	627 days; 3 days per week	Negative - Dermal - NOAEL

Reproductive toxicity

Product/ingredient name	Test	Species	Maternal toxicity	Fertility	Developmental effects
Aminoethylpiperazine	OECD 422 Combined Repeated Dose Toxicity Study with the Reproduction/ Developmental Toxicity Screening Test	Rat - Male, Female	Negative	Negative	Negative
Cycloaliphatic polyamine	OECD 422 Combined Repeated Dose	Rat - Male, Female	Positive	Positive	Negative

Section 11. Toxicological information

2,4,6-tris (dimethylaminomethyl) phenol	Toxicity Study with the Reproduction/ Developmental Toxicity Screening Test OECD 422 Combined Repeated Dose Toxicity Study with the Reproduction/ Developmental Toxicity Screening Test	Rat - Male, Female	Negative	Negative	Negative

Teratogenicity

Product/ingredient name	Test	Species	Result/Result type
Tetraethylenepentamine	OECD 414 Prenatal Developmental Toxicity Study	Rat - Female	Negative - Oral
	OECD 414 Prenatal Developmental Toxicity Study	Rabbit - Female	Negative - Dermal
Aminoethylpiperazine	OECD 422 Combined Repeated Dose Toxicity Study with the Reproduction/ Developmental Toxicity Screening Test	Rat - Male, Female	Negative - Oral

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Product/ingredient name	Category	Route of exposure	Target organs
4,4'-methylenebis(cyclohexylamine)	Category 2	Oral	liver and muscle tissue
2,4,6-tris(dimethylaminomethyl)phenol	Category 2	Oral	brain

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Causes serious eye damage.

Inhalation : May give off gas, vapor or dust that is very irritating or corrosive to the respiratory system. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Skin contact : Causes severe burns. May cause an allergic skin reaction.

Section 11. Toxicological information

Ingestion : Harmful if swallowed. May cause burns to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain
watering
redness

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:
pain or irritation
redness
blistering may occur

Ingestion : Adverse symptoms may include the following:
stomach pains

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Product/ingredient name	Test	Endpoint	Species	Result
Tetraethylenepentamine	No official guidelines	Sub-chronic NOAEL Oral	Rat - Male, Female	50 mg/kg/d
	OECD 410 Repeated Dose Dermal Toxicity: 21/28-day Study	Sub-acute NOAEL Dermal	Rabbit - Male, Female	50 mg/kg/d
Aminoethylpiperazine	OECD 422 Combined Repeated Dose Toxicity Study with the Reproduction/ Developmental Toxicity Screening Test	Sub-acute NOAEL Oral	Rat - Male, Female	151 to 285 mg/ kg/d
	OECD 410 Repeated Dose Dermal Toxicity: 21/28-day Study	Sub-acute NOAEL Dermal	Rat - Male, Female	>1000 mg/kg/d
Cycloaliphatic polyamine	OECD 422 Combined Repeated Dose Toxicity Study with the Reproduction/ Developmental Toxicity Screening Test	Sub-acute NOAEL Oral	Rat - Male, Female	15 mg/kg
	OECD 413 Subchronic Inhalation Toxicity: 90-day Study	Sub-chronic NOEC Inhalation Dusts and mists	Rat - Male, Female	12.2 mg/m³

Section 11. Toxicological information

2,4,6-tris (dimethylaminomethyl) phenol	OECD 422 Combined Repeated Dose Toxicity Study with the Reproduction/ Developmental Toxicity Screening Test	Sub-acute NOEL Oral	Rat - Male, Female	15 mg/kg
3-aminopropyltriethoxysilane	OECD 408 Repeated Dose 90-Day Oral Toxicity Study in Rodents	Sub-chronic NOAEL Oral	Rat - Male, Female	200 mg/kg

General : May cause damage to organs through prolonged or repeated exposure. 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.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	1768.1 mg/kg
Dermal	3317.6 mg/kg

Other information : Not available.

Section 12. Ecological information

Toxicity

Product/ingredient name	Test	Endpoint		Exposure	Species	Result	
2-propenenitrile polymer with 1,3-butadiene, 1-cyano-1-methyl-4-oxo-4-[[2-(1-piperazinyl)ethyl]amino] butyl-terminated	OECD 201 Alga, Growth Inhibition Test	Acute	EC50	72 hours	Algae	>1000	mg/l
	OECD 202 *Daphnia* sp. Acute Immobilisation Test	Acute	EC50	48 hours	Daphnia	<1000	mg/l
Tetraethylenepentamine	No official guidelines	Acute	EC50	2 hours Static	Bacteria	97.3	mg/l
	EU EC C.2 Acute Toxicity for Daphnia	Acute	EC50	48 hours Static	Daphnia	24.1	mg/l
	OECD 201 Alga, Growth Inhibition Test	Acute	ErC50 (growth rate)	72 hours Static	Algae	6.8	mg/l
	EU EC C.1 Acute Toxicity for Fish	Acute	LC50	96 hours Semi-static	Fish	420	mg/l
	No official guidelines	Chronic	EC10	2 hours Static	Bacteria	46	mg/l
	OECD 201 Alga,	Chronic	NOEC	72 hours	Algae	0.5	mg/l

Section 12. Ecological information

	Growth Inhibition Test			Static			
Aminoethylpiperazine	OECD 201 Alga, Growth Inhibition Test	Acute	EC50	72 hours	Algae	>1000	mg/l
	OECD 202 *Daphnia* sp. Acute Immobilisation Test	Acute	EC50	48 hours Static	Daphnia	58	mg/l
	-	Acute	LC50	96 hours Static	Fish	2190	mg/l
	No official guidelines	Chronic	EC10	2 hours	Bacteria	250	mg/l
	-	Chronic	EC20	1 hours Static	Bacteria	1600	mg/l
	ISO ISO 9509:2006 - Toxicity test for assessing the inhibition of nitrification of activated sludge microorganisms	Chronic	EC50	2 hours Static	Bacteria	511	mg/l
Cycloaliphatic polyamine	DIN DIN 38412 Part 27	Acute	EC50	30 minutes	Bacteria	156	mg/l
	OECD 202 *Daphnia* sp. Acute Immobilisation Test	Acute	EC50	48 hours Static	Daphnia	6.84	mg/l
	DIN DIN 38412 part 9	Acute	ErC50 (growth rate)	72 hours Static	Algae	141 to 200	mg/l
	DIN DIN 38412 Part 15	Acute	LC50	96 hours Static	Fish	67.8	mg/l
	DIN DIN 38412 part 9	Chronic	LOAEL	72 hours Static	Algae	100	mg/l
2,4,6-tris (dimethylaminomethyl)phenol	OECD 201 Alga, Growth Inhibition Test	Acute	ErC50 (growth rate)	72 hours Static	Algae	84	mg/l
	Unknown guidelines	Acute	LC50	96 hours Static	Daphnia	718	mg/l
	-	Acute	LC50	96 hours Static	Fish	175	mg/l
	-	Chronic	NOEC	72 hours	Algae	6.25	mg/l
3-aminopropyltriethoxysilane	EU EC C.3 Algal Inhibition Test	Acute	EC50	72 hours Static	Algae	>1000	mg/l
	-	Acute	EC50	5.75 hours Static	Bacteria	43	mg/l
	OECD 202 *Daphnia* sp. Acute Immobilisation Test	Acute	EC50	48 hours Static	Daphnia	331	mg/l
	OECD 203 Fish, Acute Toxicity Test	Acute	LC50	96 hours Semi-static	Fish	>934	mg/l
	EU EC C.3 Algal Inhibition Test	Chronic	NOECr	72 hours Static	Algae	1.3	mg/l

Persistence and degradability

Section 12. Ecological information

Product/ingredient name	Test	Period	Result
2-propenenitrile polymer with 1,3-butadiene, 1-cyano-1-methyl-4-oxo-4-[[2-(1-piperazinyl)ethyl]amino] butyl-terminated	-	- days	- %
Tetraethylenepentamine	OECD 302A Inherent Biodegradability: Modified SCAS Test	84 days	17 %
Aminoethylpiperazine	OECD 301F Ready Biodegradability - Manometric Respirometry Test	28 days	0 %
Cycloaliphatic polyamine	OECD 302B Inherent Biodegradability: Zahn-Wellens/EMPA Test	28 days	<10 %
2,4,6-tris (dimethylaminomethyl)phenol	OECD 301D Ready Biodegradability - Closed Bottle Test	28 days	4 %
3-aminopropyltriethoxysilane	EU EC C.4-A Biodegradation: Determination of the "Ready" Biodegradability: Dissolved Organic Carbon (DOC) Die-Away Test	28 days	67 %

Conclusion/Summary : Aminoethylpiperazine Not readily biodegradable.

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Aminoethylpiperazine	-	50%; 0.08 day(s)	Not readily
Cycloaliphatic polyamine	-	-	Not readily
2,4,6-tris (dimethylaminomethyl)phenol	-	-	Not readily
3-aminopropyltriethoxysilane	-	-	Not readily

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Tetraethylenepentamine	-3.16	-	low
Aminoethylpiperazine	-1.48	-	low
Cycloaliphatic polyamine	2.03	10.15	low
2,4,6-tris (dimethylaminomethyl)phenol	0.219	-	low
3-aminopropyltriethoxysilane	1.7	3.4	low

Mobility in soil

Not available.

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

Other ecological information

BOD5 : Not determined.

COD : Not determined.

TOC : Not determined.

Section 13. Disposal considerations

Disposal methods : 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.

Section 14. Transport information

Proper shipping name

DOT : Amines, liquid, corrosive, n.o.s. (Tetraethylenepentamine , Aminoethylpiperazine). Marine pollutant

TDG : Amines, liquid, corrosive, n.o.s. (Tetraethylenepentamine , Aminoethylpiperazine). Marine pollutant

IMDG : Amines, liquid, corrosive, n.o.s. (Tetraethylenepentamine , Aminoethylpiperazine). Marine pollutant

IATA : Amines, liquid, corrosive, n.o.s. (Tetraethylenepentamine , Aminoethylpiperazine)

Regulatory information	UN number	Classes	PG*	Label	Additional information
DOT Classification	UN2735	8	II		The marine pollutant mark is not required when transported on inland waterways in sizes of ≤5 L or ≤5 kg or by road, rail, or inland air in non-bulk sizes.
TDG Classification	UN2735	8	II		The marine pollutant mark is not required when transported by road or rail.
IMDG Classification	UN2735	8	II		The marine pollutant mark is not required when transported in sizes of ≤5 L or ≤5 kg. **Emergency schedules (EmS)** F-A S-B

Section 14. Transport information

IATA Classification	UN2735	8	II		The environmentally hazardous substance mark may appear if required by other transportation regulations. **Passenger and Cargo Aircraft** Quantity limitation: 5 L Packaging instructions: 852 **Cargo Aircraft Only** Quantity limitation: 60 L Packaging instructions: 856

PG* : Packing group

Section 15. Regulatory information

Safety, health and environmental regulations specific for the product

United States Regulations

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

TSCA 5(a)2 final significant new use rule (SNUR) : No ingredients listed.

TSCA 5(e) substance consent order : No ingredients listed.

TSCA 12(b) export notification : No ingredients listed.

SARA 311/312 : Immediate (acute) health hazard
Delayed (chronic) health hazard

Clean Air Act - Ozone Depleting Substances (ODS) : This product does not contain nor is it manufactured with ozone depleting substances.

SARA 313 : No ingredients listed.

CERCLA Hazardous substances : No ingredients listed.

State regulations

PENNSYLVANIA - RTK : Aminoethylpiperazine, Tetraethylenepentamine

California Prop 65 : **WARNING:** This product contains less than 1% of a chemical known to the State of California to cause birth defects or other reproductive harm.

Ingredient name	Cancer	Reproductive

Section 15. Regulatory information

Methanol	No.	Yes.

Canadian regulations

CEPA DSL : All components are listed or exempted.

WHMIS Classes : Class D-2B: Material causing other toxic effects (Toxic).
Class E: Corrosive material

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

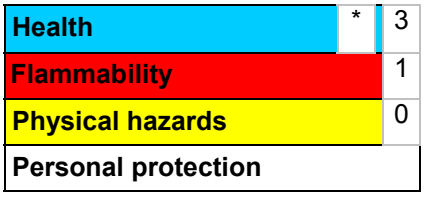
Brazil Regulations

Classification system used : **Norma ABNT-NBR 14725-2:2012**

International lists : **Australia inventory (AICS)**: All components are listed or exempted.
China inventory (IECSC): All components are listed or exempted.
Japan inventory: Not determined.
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.

Section 16. Other information

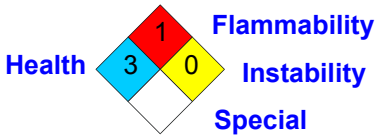
Hazardous Material Information System (U.S.A.) :



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

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 SDSs 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.

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



Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Section 16. Other information

Further information :

Date of printing : **2/24/2015.**

Date of issue : 2/24/2015.

Date of previous issue : 1/24/2015.

Version : 4

Indicates information that has changed from previously issued version.

Notice to reader

While the information and recommendations in this publication are to the best of our knowledge, information and belief accurate at the date of publication, NOTHING HEREIN IS TO BE CONSTRUED AS A WARRANTY, EXPRESS OR OTHERWISE.

IN ALL CASES, IT IS THE RESPONSIBILITY OF THE USER TO DETERMINE THE APPLICABILITY OF SUCH INFORMATION AND RECOMMENDATIONS AND THE SUITABILITY OF ANY PRODUCT FOR ITS OWN PARTICULAR PURPOSE.

THE PRODUCT MAY PRESENT HAZARDS AND SHOULD BE USED WITH CAUTION. WHILE CERTAIN HAZARDS ARE DESCRIBED IN THIS PUBLICATION, NO GUARANTEE IS MADE THAT THESE ARE THE ONLY HAZARDS THAT EXIST.

Hazards, toxicity and behaviour of the products may differ when used with other materials and are dependent upon the manufacturing circumstances or other processes. Such hazards, toxicity and behaviour should be determined by the user and made known to handlers, processors and end users.

NO PERSON OR ORGANIZATION EXCEPT A DULY AUTHORIZED HUNTSMAN EMPLOYEE IS AUTHORIZED TO PROVIDE OR MAKE AVAILABLE DATA SHEETS FOR HUNTSMAN PRODUCTS. DATA SHEETS FROM UNAUTHORIZED SOURCES MAY CONTAIN INFORMATION THAT IS NO LONGER CURRENT OR ACCURATE. NO PART OF THIS DATA SHEET MAY BE REPRODUCED OR TRANSMITTED IN ANY FORM, OR BY ANY MEANS, WITHOUT PERMISSION IN WRITING FROM HUNTSMAN. ALL REQUESTS FOR PERMISSION TO REPRODUCE MATERIAL FROM THIS DATA SHEET SHOULD BE DIRECTED TO HUNTSMAN, MANAGER, PRODUCT SAFETY AT THE ABOVE ADDRESS.