THERMAL GUARD METAL (Part A)

SAFETY DATA SHEET

ACCORDING TO USA FEDERAL HAZCOM 012

1. IDENTIFICATION

1.1. Product Identifier

Code:	A-THERM-MET
Product name	**THERMAL GUARD METAL (Part A)**

1.2. Relevant identified uses of the substance or mixture and uses advised against

Intended use	***High-build aspartic polyurea Base A for water & thermal insulation, Liquid Applied Membrane (LAM) applications. Recommended for professional use only.***

1.3. Details of the supplier of the safety data sheet

Name	**Armus LLC**
Full address	**137 Grand Street 3rd Floor**
	New York, NY 10013
Country	**United States**
	Tel. (+1) 917-957-5383
E-mail address of the competent person responsible for the Safety Data Sheet	bill@armussolutions.com

1.4. Emergency telephone number

For urgent inquiries refer to	**Tel. (+1) 917-957-5383 United States**

2. HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

The product is classified as hazardous pursuant to the provisions set forth in OSHA Hazard Communication Standard (HCS) (29 CFR 1910.1200). The product thus requires a safety datasheet.

Any additional information concerning the risks for health and/or the environment is given in sections 11 and 12 of this sheet.

Classification and Hazard Statement

Specific target organ toxicity – repeated exposure, category 1	Causes damage to organs through prolonged or repeated exposure
Skin sensitization, category 1	May cause an allergic skin reaction.

Hazard pictograms:

Signal words: **WARNING**

Hazard statements:

H372	Causes damage to organs through prolonged or repeated exposure.
H317	May cause an allergic skin reaction.

Precautionary statements:

Prevention:

P260	Do not breathe fume, mist or spray.
P280	Wear protective gloves.
P270	Do not eat, drink, or smoke when using this product.
P264	Wash with plenty of water and soap thoroughly after handling.
P272	Contaminated work clothing should not be allowed out of the workplace.

Response:

P314	Seek medical advice / attention if you feel unwell.
P333+P313	If skin irritation or rash occurs: Seek medical advice / attention immediately.
P302+P352	IF ON SKIN: Wash with plenty of water.
P363	Wash contaminated clothing before reuse.

Storage:

Disposal:

P501	Dispose of contents or container according to local/national/international regulations

2.2 Other hazards

Contains:

4-morpholinecarbaldehyde May produce an allergic reaction.

3. COMPOSITION / INFORMATION ON INGREDIENTS

3.1. Components

Chemical Name	*CAS-No*	*Conc. %*	*Classification*
Aspartic Acid, N,N'-(methylenedi-4,1-cyclohexanediyl)bis-, 1,1',4,4'-tetraethyl ester	136210-30-5	40 < x < 60	Skin sensitization, category 1 H317, Hazardous to the aquatic environment, chronic toxicity, category 3 H412
Tridymite	15468-32-3	1 < x < 4	Specific target organ toxicity - repeated exposure, category 1 H372
Cristobalite	14464-46-1	1 < x < 4	Specific target organ toxicity - repeated exposure, category 1 H372

The full wording of hazard (H) phrases is given in section 16 of the sheet.

4. FIRST-AID MEASURES

4.1. Description of first aid measures

GENERAL ADVICE:	Move out of work / application area. Consult a physician. Show this material safety data sheet to the doctor in attendance.
EYES:	Remove contact lenses. In the case of contact with eyes, rinse immediately with plenty of water and seek medical attention. Keep eyes wide open while rinsing. Continue rinsing eyes during transport to medical facility for at least 30-60 minutes.
SKIN:	Take off contaminated clothing and shoes immediately. Wash immediately with plenty of water.

If irritation persists, seek medical advice/attention.
Wash contaminated clothing before using it again.

INHALATION: Move to fresh air.
In the event of breathing difficulties, seek medical advice / attention immediately.

INGESTION: Seek medical advice / attention immediately.
Do not induce vomiting without medical advice.
Never give anything by mouth to an unconscious person, unless authorized by a doctor.

4.2. Most important symptoms and effects, both acute and delayed
Specific information on symptoms and effects caused by the product is unknown.

4.3. Indication of any immediate medical attention and special treatment needed
Not applicable based on available information.

5. FIRE-FIGHTING MEASURES

5.1. Extinguishing media

Suitable extinguishing equipment: The extinguishing equipment should be of the conventional kind: carbon dioxide, foam, powder, and water spray.

Unsuitable extinguishing equipment: None in particular.

5.2. Special hazards arising from the substance or mixture

Specific hazards during fire fighting: Do not breathe combustion products.

5.3. Advice for firefighters

General information: Use jets of water to cool the containers to prevent product decomposition and the development of substances potentially hazardous for health.
Always wear full fire prevention gear.
Collect extinguishing water to prevent it from draining into the sewer system.
Dispose of contaminated water used for extinction and the remains of the fire according to applicable regulations.

Special protective equipment for fire-fighters: Normal firefighting clothing i.e., fire kit (BS EN 469), gloves (BS EN 659) and boots (HO specification A29 and A30) in combination with self-contained open circuit positive pressure compressed air breathing apparatus (BS EN 137).

6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment, and emergency procedures
Block the leakage.
Wear suitable protective equipment (including personal protective equipment referred to under section 8 of the safety data sheet) to prevent any contamination of skin, eyes, and clothing.
These indications apply for both product users and those involved in emergency procedures.

6.2. Environmental precautions
The product must not enter the sewer system or come into contact with surface water or groundwater.

6.3. Methods and material for containment and cleaning up
Collect the leaked product.
Absorb spilled material with inert absorbent material.
Make sure the leakage site is well-aired.
Contaminated material should be disposed of in compliance with the provisions set forth in section 13.

6.4. Reference to other sections
Any information on personal protection and disposal is given in sections 8 and 13.

7. HANDLING AND STORAGE

7.1. Precautions for safe handling
Before handling the product, consult all the other sections of this material safety data sheet.
Do not eat, drink, or smoke during use.
Remove any contaminated clothes and personal protective equipment before entering places in which people eat.
This product must not enter the sewer system or come into contact with surface water or groundwater.

7.2. Conditions for safe storage, including any incompatibilities
Store only in the original container.
Store the containers sealed, in a well-ventilated place, away from direct sunlight.

7.3. Specific end use(s)
Refer to section 1.2

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1. Control parameters
Regulatory References:

USA	CAL/OSHA-PEL	California Division of Occupational Safety and Health (Cal-OSHA) Permissible Exposure Limits (PELs).
EU	OEL EU	Directive (EU) 2019/1831; Directive (EU) 2019/130; Directive (EU) 2019/983; Directive (EU) 2017/2398; Directive (EU) 2017/164; Directive 2009/161/EU; Directive 2006/15/EC; Directive 2004/37/EC; Directive 2000/39/EC; Directive 98/24/EC; Directive 91/322/EEC.
	TLV-ACGIH	ACGIH 2020

CRISTOBALITE

Threshold Limit Value						
Type	Country	TWA / 8h		STEL/15min		Remarks / Observations
		mg/m3	ppm	mg/m3	Ppm	
CAL/OSHA	USA	0.05				RESP
OEL	EU	0.1				RESP
TLV-ACGIH	-	0.025				RESP

TRIDYMITE

Threshold Limit Value						
Type	Country	TWA / 8h		STEL/15min		Remarks / Observations
		mg/m3	ppm	mg/m3	Ppm	
CAL/OSHA	USA	0.05				RESP

Legend:
(C) = CEILING
INHAL = Inhalable Fraction
RESP = Respirable Fraction
THORA = Thoracic Fraction

8.2. Exposure controls
As the use of adequate technical equipment must always take priority over personal protective equipment, make sure that the workplace is well aired through effective local ventilation.
Personal protective equipment must comply with current regulations.

Hand Protection Protect hands with category III work gloves (OSHA 29 CFR 1910.138).

	The following should be considered when choosing work glove material: compatibility, degradation, failure time and permeability. The work gloves' resistance to chemical agents should be checked before use, as it can be unpredictable. The gloves' wear time depends on the duration and type of use.
Skin Protection	Wear category I professional long-sleeved overalls and safety footwear. Wash body with soap and water after removing protective clothing.
Eye Protection	Wear airtight protective goggles (OSHA 29 CFR 1910.133).
Respiratory Protection	If the threshold value (e.g., TLV-TWA) is exceeded for the substance or one of the substances present in the product, wear a mask with a NIOSH certified filter, whose class must be chosen according to the limit of use concentration (NIOSH 42 CFR 84, OSHA 29 CFR 1910.134). In the presence of gases or vapors of various kinds and/or gases or vapors containing particulate (aerosol sprays, fumes, mists, etc.) combined filters are required. Respiratory protection devices must be used if the technical measures adopted are not suitable for restricting the worker's exposure to the threshold values considered. The protection provided by masks is in any case limited. If the substance considered is odorless or its olfactory threshold is higher than the corresponding TLV-TWA and in the case of an emergency, wear open-circuit compressed air breathing apparatus or external air-intake breathing apparatus. For a correct choice of respiratory protection device, see standard NIOSH 42 CFR 84, OSHA 29 CFR 1910.134.
Environmental Exposure Controls	The emissions generated by manufacturing processes, including those generated by ventilation equipment, should be checked to ensure compliance with environmental standards. This product must not enter the sewer system or come into contact with surface water or groundwater.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance	Liquid Suspension
Color	White
Odor	Light
pH	Not applicable
Boiling point	> 176° F (80°C)
Flash point	> 131°F (55°C)
Relative density	67.42 lb/ft^3 (1.08 kg/L)
Solubility	Xylene, n-butyl acetate
Auto-ignition temperature	> 842°F (450°C)
Viscosity	> 1,700 cP

10. STABILITY AND REACTIVITY

10.1. Reactivity
There are no particular risks of reaction with other substances in normal conditions of use.

10.2. Chemical stability
The product is stable in normal conditions of use and storage.

10.3. Possibility of hazardous reactions
No hazardous reactions are foreseeable in normal conditions of use and storage.

10.4. Conditions to avoid
Non in particular. However, the usual precautions used for chemical products should be respected.

10.5. Incompatible materials
None based on available information.

10.6. Hazardous decomposition products
None based on available information.

11. TOXICOLOGICAL INFORMATION

In the absence of experimental data for the product itself, health hazards are evaluated according to the properties of the substances it contains, using the criteria specified in the applicable regulation for classification. It is therefore necessary to take into account the concentration of the individual substances indicated in section 3, to evaluate the toxicological effects of exposure to the product.

11.1. Information on toxicological effects

Metabolism, toxicokinetics, mechanism of action and other information

Cristobalite	The probably of carcinogenic risk is related to the presence of quartz.

Information on likely routes of exposure

Cristobalite	Workers	Inhalation

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Cristobalite	The crystalline forms of silica are those of more interest to occupational medicine and industrial hygiene since they are responsible for diseases of a disabling nature. Exposure to dust containing crystalline silica causes silicosis. Chronic silicosis occurs after a variable period from exposure (latency), progressing even after interruption of exposure, closely related to the extent and duration of exposure (deterministic effects). Over time, this situation tends to worsen, even so far as to cause the death of the person suffering from silicosis. Patients suffering from silicosis are often associated with tuberculosis (silico-tuberculosis), currently widespread in many developing countries. In a more overall perspective, silicosis is to be considered only the initial stage of a disease that has a high risk of progressing and generating more serious complications, such as lung cancer and autoimmune diseases.

Interactive effects
Not classified based on available information.

Acute toxicity

Titanium Dioxide	LD50 (Oral) > 10000 mg/kg Rat

Skin corrosion / irritation
Not classified based on available information.

Serious eye damage / irritation
Not classified based on available information.

Respiratory or skin sensitization
Sensitizing for the skin.

4-morpholinecarbaldehyde	May produce an allergic reaction.

Germ cell mutagenicity
Not classified based on available information.

Carcinogenicity

Cristobalite	14464-46-1	AGCIH: A2

Classified in Group 1 (human carcinogen) by the International Agency for Research on Cancer (IARC).
Classified in group A2 (suspected human carcinogen) by the American Conference for Governmental Industrial Hygienists (ACGIH).

Reproductive toxicity
Not classified based on available information.

STOT – single exposure
Not classified based on available information.

STOT – repeated exposure
Not classified based on available information.

Aspiration toxicity / hazard
Not classified based on available information.

12. ECOLOGICAL INFORMATION

This product is dangerous for the environment and is toxic for aquatic organisms. In the long term, it has negative effects on aquatic environment.

12.1. Toxicity
None based on available information.

12.2. Persistence and degradability

Titanium Dioxide	
Solubility in water	< 0.001 mg/l
Degradability	Information not available

12.3. Bioaccumulative potential
None based on available information.

12.4. Mobility in soil
None based on available information.

12.5. Results of PBT and vPvB assessment
On the basis of available data, the product does not contain any Persistent, Bioaccumulative and Toxic (PBT) or very Persistent and very Bio-accumulative (vPvB) substances.

13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	Reuse, when possible. Unused product should be considered special non-hazardous waste. Disposal must be performed through an authorized waste management firm, in compliance with local, national, and international regulations.
Contaminated Packaging	Contaminated packaging must be recovered or disposed of in compliance with all waste management regulations.

14. TRANSPORTATION INFORMATION

This product is not dangerous under current provisions of the Code of International Carriage of Dangerous Goods by Road (ADR) and by Raid (RID) of the International Maritime Dangerous Codes Code (IMDG), and of the International Air Transport Association (IATA) regulations.

15. REGULATORY INFORMATION

U.S. Federal Regulations

TSCA	All components of this product are listed on US Toxic Substances Control Act (TSCA) Inventory considered as "existing" chemical substances in U.S. commerce.
Clean Air Act Sections 112(b), including 602 Class I and 602 Class II Substances	This product, in compliance to the Act, does not contain any substances regulated as pollutants.
Clean Water Act Priority or/and Toxic Pollutants	This product, in compliance to the Act, does not contain any substances regulated as pollutants.
DEA List I Chemicals (Precursor Chemicals) and List II Chemicals (Essential Chemicals)	No component(s) listed; in compliance with the List.
EPA List of Lists 313 Category Code:	No component(s) listed; in compliance with the List.
EPCRA 302 EHS TPQ	No component(s) listed; in compliance with the List.
CERCLA RQ	No component(s) listed; in compliance with the List.
EPCRA 313 TRI	No component(s) listed; in compliance with the List.
RCRA Code	No component(s) listed; in compliance with the List.
CAA 112 (r) TMP TQ	No component(s) listed; in compliance with the List.

State Regulations

Massachusetts / Minnesota

CAS 13463-67-7	TITANIUM DIOXIDE (Titanium dioxide (airborne, unbound particles of respirable size))
CAS 14464-46-1	CRISTOBALITE (Cristobalite dust)
CAS 14808-60-7	QUARTZ (Quartz dust)
CAS 15468-32-3	TRIDYMITE
CAS 7631-86-9	AMORPHOUS SILICATE HYDRATE

New Jersey:

CAS 13463-67-7	TITANIUM DIOXIDE (Titanium dioxide (airborne, unbound particles of respirable size))
CAS 14464-46-1	CRISTOBALITE (Cristobalite dust)
CAS 14808-60-7	QUARTZ (Quartz dust)
CAS 15468-32-3	TRIDYMITE

New York:

No component(s) listed.

Pennsylvania:

CAS 13463-67-7	TITANIUM DIOXIDE (Titanium dioxide (airborne, unbound particles of respirable size))
CAS 68855-54-9	DIATOMACEOUS EARTH, FLUX CALCINED
CAS 14464-46-1	CRISTOBALITE (Cristobalite dust)
CAS 14808-60-7	QUARTZ (Quartz dust)
CAS 15468-32-3	TRIDYMITE
CAS 7631-86-9	AMORPHOUS SILICATE HYDRATE

California:

CAS 7631-86-9	AMORPHOUS SILICATE HYDRATE

CA Proposition 65:

WARNING! This product contains chemicals known to the State of California to cause cancer, reproductive harm, or birth defects.

13463-67-7	TITANIUM DIOXIDE (Titanium dioxide (airborne, unbound particles of respirable size))

16. OTHER INFORMATION

Text of hazard (H) indications mentioned in section 2-3 of the sheet:

H372	Causes damage to organs through prolonged or repeated exposure.
H317	May cause an allergic skin reaction.

LEGEND:

313 CATEGORY CODE	Emergency Planning and Community Right-to Know Act Section 313 Category Code
ADR	European Agreement concerning the carriage of Dangerous goods by Road
CAA 112 (r) RMP TQ	Risk Management Plan Threshold Quantity (Clean Air Act Section 112(R))
CAS NUMBER	Chemical Abstract Service Number
CE50	Effective concentration (required to induce a 50% effect)
CERCLA RQ	Reportable Quantity (Comprehensive Environment Response, Compensation, and Liability Act)
CLP	EC Regulation 1272/2008
DEA	Drug Enforcement Administration
EmS	Emergency Schedule
EPA	US Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPCRA 302 EHS TPQ	Extremely Hazardous Substance Threshold Planning Quantity (Section 302 Category Code)
EPCRA 304 EHS RQ	Extremely Hazardous Substance Reportable Quantity (Section 304 Category Code)
EPCRA 313 TRI	Toxics Release Inventory (Section 313 Category Code)
GHS	Globally Harmonized System of classification and labeling of chemicals
IATA DGR	International Air Transport Association Dangerous Goods Regulation
IC50	Immobilization Concentration 50%
IMDG	International Maritime Code for dangerous goods
IMO	International Maritime Organization
LC50	Lethal Concentration 50%
LD50	Lethal Dose 50%
OEL	Occupational Exposure Level
PEL	Predicted Exposure Level
RCRA Code	Resource Conservation and Recovery Act Code
REL	Recommended Exposure Limit
RID	Regulation concerning the international transport of dangerous goods by train
TLV	Threshold Limit Value
TLV CEILING	Concentration that should not be exceeded during any time of occupational exposure.
TSCA	Toxic Substances Control Act
TWA STEL	Short-term Exposure Limit
TWA	Time-weighted Average Exposure Limit
VOC	Volatile Organic Compounds
WHMIS	Workplace Hazardous Materials Information System

GENERAL BIBLIOGRAPHY:

- GHS rev. 3
- The Merck Index. 10th Edition
- Handling Chemical Safety
- Niosh - Registry of Toxic Effects of Chemical Substances
- INRS - Fiche Toxicologique (toxicological sheet)
- Patty - Industrial Hygiene and Toxicology
- N.I. Sax - Dangerous properties of Industrial Materials-7, 1989 Edition
- ECHA website
- Database of SDS models for chemicals - Ministry of Health and ISS (Istituto Superiore di Sanità) - Italy
- 6 NYCRR part 597
- Cal/OSHA website
- California Safe Drinking Water and Toxic Enforcement Act
- EPA website
- Hazard Communication Standard (HCS 2012)
- IARC website
- List Of Lists EPA: Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112® of the Clean Air Act
- Massachusetts 105 CMR Department of public health 670.000: "Right to Know"
- Minnesota Chapter 5206 Department of Labor and Industry Hazardous Substances, Employee "Right to Know".
- New Jersey Worker and Community Right to know Act N.J.S.A.
- NTP. 2011. Report on Carcinogens, 12th Edition.

- OSHA website
- Pennsylvania, Hazardous Substance List, Chapter 323

NOTE FOR USERS:

The information contained in the present sheet are based on our own knowledge on the date of the last version. Users must verify the suitability and thoroughness of provided information according to each specific use of the product.
This document must not be regarded as a guarantee on any specific product property.
The use of this product is not subject to our direct control; therefore, users must, under their own responsibility, comply with the current health and safety laws and regulations. The producer is relieved from any liability arising from improper uses.
Purchasers must provide product users with adequate training on how to use chemical products.

ARMUS MAKES NO WARRANTIES EXPRESS OR IMPLIED AND ASSUMES NO LIABILITY ARISING FROM THIS INFORMATION OR ITS USE. ARMUS SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR CONSEQUENTIAL DAMAGES AND SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHT HELD BY OTHERS.

CALCULATION METHODS FOR CLASSIFICATION

Product classification derives from criteria established by the OSHA Hazard Communication Standard (HCS) (29 CFR 1910.1200), unless determined otherwise in Section 11 and 12.
The data for evaluation of chemical-physical properties are reported in section 9.

Changes to previous review:

The following sections were modified: 02 / 03 / 08 / 11 / 15.

THERMAL GUARD METAL (Part B)

SAFETY DATA SHEET

ACCORDING TO USA FEDERAL HAZCOM 012

1. IDENTIFICATION

1.1. Product Identifier

Code:	A-THERM-MET
Product name	**THERMAL GUARD METAL (Part B)**

1.2. Relevant identified uses of the substance or mixture and uses advised against

Intended use	***High-build aspartic polyurea Hardener B for water & thermal insulation, Liquid Applied Membrane (LAM) applications. Recommended for professional use only.***

1.3. Details of the supplier of the safety data sheet

Name	**Armus LLC**
Full address	**137 Grand Street 3rd Floor**
	New York, NY 10013
Country	**United States**
	Tel. (+1) 917-957-5383
E-mail address of the competent person responsible for the Safety Data Sheet	bill@armussolutions.com

1.4. Emergency telephone number

For urgent inquiries refer to	**Tel. (+1) 917-957-5383 United States**

2. HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

The product is classified as hazardous pursuant to the provisions set forth in OSHA Hazard Communication Standard (HCS) (29 CFR 1910.1200). The product thus requires a safety datasheet.

Any additional information concerning the risks for health and/or the environment is given in sections 11 and 12 of this sheet.

Classification and Hazard Statement

Acute toxicity, category 3	Toxic if inhaled
Specific target organ toxicity – single exposure, category 3	May cause respiratory irritation
Respiratory sensitization, category 1	May cause allergy or asthma symptoms or breathing difficulties if inhaled
Skin sensitization, category 1	May cause an allergic skin reaction

Hazard pictograms:

Signal words: **DANGER**

Hazard statements:

H331	Toxic if inhaled.
H335	May cause respiratory irritation.
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H317	May cause an allergic skin reaction.

Precautionary statements:

Prevention:

P261	Avoid breathing in fumes, mist, or spray.
P280	Wear protective gloves.
P271	Use only outdoors or in a well-ventilated area.
P272	Contaminated work clothing should not be allowed out of the workplace.
P284	[In case of inadequate ventilation] wear respiratory protection.

Response:

P311	Call your local POISON CONTROL CENTER / doctor
P312	Call your local POISON CONTROL CENTER / doctor if you feel unwell.
P304+P340	IF INHALED: Move person to fresh air and keep comfortable for breathing.
P302+P352	IF ON SKIN: Wash with plenty of water
P363	Wash contaminated clothing before reuse.

Storage:

P403+P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.

Disposal:

P501	Dispose of contents or container according to local/national/international regulations

2.2 Other hazards

Contains:

Isocyanates	May produce an allergic reaction.

3. COMPOSITION / INFORMATION ON INGREDIENTS

3.1. Components

Chemical Name	***CAS-No***	***Conc. %***	***Classification***
Aliphatic Polyisocyanate 1	164250-92-4	23 < x < 43	Acute toxicity, category 4 H332, Specific target organ toxicity - single exposure, category 3 H335, Skin sensitization, category 1B H317, Hazardous to the aquatic environment, chronic toxicity, category 2 H411
Aliphatic Polyisocyanate 2	29891-05-2	5 < x < 20	Acute toxicity, category 4 H332, Specific target organ toxicity - single exposure, category 3 H335, Skin sensitization, category 1B H317, Hazardous to the aquatic environment, chronic toxicity, category 2 H411
Aliphatic Polyisocyanate 3	1809331-98-3	1 < x < 2	Acute toxicity, category 4 H332, Specific target organ toxicity - single exposure, category 3 H335, Skin sensitization, category 1 H317, Hazardous to the aquatic environment, chronic toxicity, category 2 H411

hexamethylene-di-isocyanate	822-06-0	0.1 < x < 0.5	Acute toxicity, category 1 H330, Acute toxicity, category 4 H302, Eye irritation, category 2 H319, Skin irritation, category 2 H315, Specific target organ toxicity - single exposure, category 3 H335, Respiratory sensitization, category 1 H334, Skin sensitization, category 1 H317

The full wording of hazard (H) phrases is given in section 16 of the sheet.

4. FIRST-AID MEASURES

4.1. Description of first aid measures

GENERAL ADVICE:
Move out of work / application area.
Consult a physician.
Show this material safety data sheet to the doctor in attendance.

EYES:
Remove contact lenses.
Keep eyes wide open while rinsing.
In the case of contact with eyes, rinse immediately with plenty of water for at least 15 minutes and seek medical attention.

SKIN:
Take off contaminated clothing and shoes immediately.
Wash immediately and shower with plenty of water.
If irritation persists, seek medical advice / attention.
Wash contaminated clothing before using it again.

INHALATION:
Move to fresh air.
In the event of breathing difficulties, seek medical advice/attention immediately.
If the subject stops breathing, administer artificial respiration.

INGESTION:
Seek medical advice / attention immediately.
Do not induce vomiting without medical advice.
Never give anything by mouth to an unconscious person, unless authorized by a doctor.

4.2. Most important symptoms and effects, both acute and delayed
Specific information on symptoms and effects caused by the product is unknown.

4.3. Indication of any immediate medical attention and special treatment needed
Not applicable based on available information.

5. FIRE-FIGHTING MEASURES

5.1. Extinguishing media

Suitable extinguishing equipment
The extinguishing equipment should be of the conventional kind: carbon dioxide, foam, powder, and water spray.

Unsuitable extinguishing equipment
None in particular.

5.2. Special hazards arising from the substance or mixture

Specific hazards during fire fighting
Do not breathe combustion products.

5.3. Advice for firefighters

General information
Use jets of water to cool the containers to prevent product decomposition and the development of substances potentially hazardous for health.
Always wear full fire prevention gear.
Collect extinguishing water to prevent it from draining into the sewer system.
Dispose of contaminated water used for extinction and the remains of the fire according to applicable regulations.

Special protective equipment for fire-fighters	Normal firefighting clothing i.e., fire kit (BS EN 469), gloves (BS EN 659) and boots (HO specification A29 and A30) in combination with self-contained open circuit positive pressure compressed air breathing apparatus (BS EN 137).

6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment, and emergency procedures
Block the leakage.
Wear suitable protective equipment (including personal protective equipment referred to under section 8 of the safety data sheet) to prevent any contamination of skin, eyes, and clothing.
These indications apply for both product users and those involved in emergency procedures.

6.2. Environmental precautions
The product must not enter the sewer system or come into contact with surface water or ground water.

6.3. Methods and material for containment and cleaning up
Collect the leaked product.
Absorb spilled product with inert absorbent material.
Make sure the leakage site is well-aired.
Contaminated material should be disposed of in compliance with the provisions set forth in section 13.

6.4. Reference to other sections
Any information on personal protection and disposal is given in sections 8 and 13.

7. HANDLING AND STORAGE

7.1. Precautions for safe handling
Before handling the product, consult all the other sections of this material safety data sheet.
Do not eat, drink, or smoke during use.
Remove any contaminated clothes and personal protective equipment before entering places in which people eat.
This product must not enter the sewer system or come into contact with surface water or groundwater.

7.2. Conditions for safe storage, including any incompatibilities
Store only in the original container.
Store the containers sealed, in a well-ventilated place, away from direct sunlight.

7.3. Specific end use(s)
Refer to section 1.2

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1. Control parameters
Regulatory References:

USA	CAL/OSHA-PEL	California Division of Occupational Safety and Health (Cal-OSHA) Permissible Exposure Limits (PELs).
USA	NIOSH-REL	NIOSH publication No. 2005-149, 3rd printing, 2007.

HEXAMETHYLENE-DI-ISOCYANATE						
Threshold Limit Value						
Type	**Country**	**TWA / 8h**		**STEL/15min**		**Remarks / Observations**
		mg/m3	**ppm**	**mg/m3**	**Ppm**	
CAL/OSHA	USA	0.034	0.005			
NOISH-REL	USA	0.035	0.005	0.14 (C)	0.02 (C)	

Legend:
(C) = CEILING

INHAL = Inhalable Fraction
RESP = Respirable Fraction
THORA = Thoracic Fraction

8.2. Exposure controls

As the use of adequate technical equipment must always take priority over personal protective equipment, make sure that the workplace is well aired through effective local ventilation.
Personal protective equipment must comply with current regulations.

Hand Protection	Protect hands with category III work gloves (OSHA 29 CFR 1910.138). The following should be considered when choosing work glove material: compatibility, degradation, failure time and permeability. The work gloves' resistance to chemical agents should be checked before use, as it can be unpredictable. The gloves' wear time depends on the duration and type of use.
Skin Protection	Wear category I professional long-sleeved overalls and safety footwear. Wash body with soap and water after removing protective clothing.
Eye Protection	Wear airtight protective goggles (OSHA 29 CFR 1910.133).
Respiratory Protection	If the threshold value (e.g., TLV-TWA) is exceeded for the substance or one of the substances present in the product, wear a mask with a NIOSH certified filter, whose class must be chosen according to the limit of use concentration (NIOSH 42 CFR 84, OSHA 29 CFR 1910.134). In the presence of gases or vapors of various kinds and/or gases or vapors containing particulate (aerosol sprays, fumes, mists, etc.) combined filters are required. Respiratory protection devices must be used if the technical measures adopted are not suitable for restricting the worker's exposure to the threshold values considered. The protection provided by masks is in any case limited. If the substance considered is odorless or its olfactory threshold is higher than the corresponding TLV-TWA and in the case of an emergency, wear open-circuit compressed air breathing apparatus or external air-intake breathing apparatus. For a correct choice of respiratory protection device, see standard NIOSH 42 CFR 84, OSHA 29 CFR 1910.134.
Environmental Exposure Controls	This product must not enter the sewer system or come into contact with surface water or groundwater.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance	Liquid solution
Color	Transparent
Odor	Light
pH	Not applicable
Boiling point	> 176° F (80°C)
Flash point	> 131°F (55°C)
Relative density	67.42 lb/ft^3 (1.08 kg/L)
Solubility	Xylene, n-butyl acetate
Auto-ignition temperature	> 842°F (450°C)
Viscosity	> 1,500 cP

10. STABILITY AND REACTIVITY

10.1. Reactivity

There are no particular risks of reaction with other substances in normal conditions of use.

10.2. Chemical stability
The product is stable in normal conditions of use and storage.

10.3. Possibility of hazardous reactions
No hazardous reactions are foreseeable in normal conditions of use and storage.

10.4. Conditions to avoid
Non in particular. However, the usual precautions used for chemical products should be respected.

10.5. Incompatible materials
None based on available information.

10.6. Hazardous decomposition products
None based on available information.

11. TOXICOLOGICAL INFORMATION

In the absence of experimental data for the product itself, health hazards are evaluated according to the properties of the substances it contains, using the criteria specified in the applicable regulation for classification. It is therefore necessary to take into account the concentration of the individual substances indicated in section 3, to evaluate the toxicological effects of exposure to the product.

11.1. Information on toxicological effects

Metabolism, toxicokinetics, mechanism of action and other information
Not classified based on available information.

Information on likely routes of exposure
Not classified based on available information.

Delayed and immediate effects as well as chronic effects from short and long-term exposure
Not classified based on available information.

Interactive effects
Not classified based on available information.

Acute toxicity

Aliphatic Polyisocyanate 1	LD50 (Oral (Rat)) > 10000 mg/kg LD50 (Dermal (Rat)) > 2000 mg/kg LC50 (Inhalation (Rat)) 0,351 mg/ liter Exposure time: 4h
Aliphatic Polyisocyanate 2	LD50 (Oral (Rat)) > 5000 mg/kg LD50 (Dermal (Rat)) > 2000 mg/kg LC50 (Inhalation (Rat)) 0,351 mg/ liter Exposure time: 4h
Aliphatic Polyisocyanate 3	LD50 (Oral (Rat)) > 2000 mg/kg LD50 (Dermal (Rat)) > 2000 mg/kg LC50 (Inhalation (Rat)) 0,351 mg/ liter Exposure time: 4h

Skin corrosion / irritation
Not classified based on available information.

Serious eye damage / irritation
Not classified based on available information.

Respiratory or skin sensitization
Sensitizing for the skin.
Sensitizing for the respiratory system

Germ cell mutagenicity
Not classified based on available information.

Carcinogenicity
Not classified based on available information.

Reproductive toxicity
Not classified based on available information.

STOT – single exposure
May cause respiratory irritation.

STOT – repeated exposure
Not classified based on available information.

Aspiration toxicity / hazard
Not classified based on available information.

12. ECOLOGICAL INFORMATION

This product is dangerous for the environment and is toxic for aquatic organisms. In the long term, it has negative effects on aquatic environment.

12.1. Toxicity

Aliphatic Polyisocyanate 1

Toxicity to fish	LC50 (Danio rerio (Zebra Fish)): 8.9 mg/ liter Exposure time: 96 h
Toxicity Crustacea	EC50 (Daphnia Magna (Water flea)): > 100 mg/ liter Exposure time: 48 h

Aliphatic Polyisocyanate 2

Toxicity to fish	LC50 (Danio rerio (Zebra Fish)): 8.9 mg/ liter Exposure time: 96 h
Toxicity Crustacea	EC50 (Daphnia Magna (Water flea)): > 100 mg/ liter Exposure time: 48 h

Aliphatic Polyisocyanate 3

Toxicity to fish	LC50 (Danio rerio (Zebra Fish)): 8.9 mg/ liter Exposure time: 96 h
Toxicity Crustacea	EC50 (Daphnia Magna (Water flea)): > 100 mg/ liter Exposure time: 48 h

12.2. Persistence and degradability

Aliphatic Polyisocyanate 2	NOT rapidly degradable
Aliphatic Polyisocyanate 3	NOT rapidly degradable

12.3. Bioaccumulative potential
None based on available information.

12.4. Mobility in soil
None based on available information.

12.5. Results of PBT and vPvB assessment
On the basis of available data, the product does not contain any Persistent, Bioaccumulative and Toxic (PBT) or very Persistent and very Bio-accumulative (vPvB) substances.

13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	Reuse, when possible. Unused product should be considered special non-hazardous waste.

	Disposal must be performed through an authorized waste management firm, in compliance with local, national, and international regulations.
Contaminated Packaging	Contaminated packaging must be recovered or disposed of in compliance with all waste management regulations.

14. TRANSPORTATION INFORMATION

ADR/RID

UN/ID No.	UN 3082
Proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
Class	9
Packing Group	III
Labels	Label 9
	
Environmental Hazards	Environmentally Hazardous
Environmental Labels	
HIM – Kemler:	90
Limited Quantities:	5L
Notes:	In accordance with Special Provision 375, this product, when is packed in receptacles of a capacity 5Kg or 5L, is not submitted to ADR provisions.

IMDG

UN/ID No.	UN 3082
Proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
Class	9
Packing Group	III
Labels	Label 9
	
Environmental Hazards	Marine Pollutant
Environmental Labels	
EMS	F-A, S-F
Limited Quantities:	5L
Notes:	In accordance with Section 2.10.2.7 of IMDG Code, this product, when is packed in receptacles of a capacity 5Kg or 5L, is not submitted to IMDG Code provisions.

IATA

UN/ID No.	UN 3082 In accordance with SP A197, this product, when is packed in receptacles of a capacity 5Kg or 5L, is not submitted to IATA dangerous goods regulations.
Proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
Class	9
Packing Group	III
Labels	Label 9
	
Environmental Hazards	Environmentally Hazardous
Environmental Labels	

Packing instruction (cargo aircraft)	Maximum Quantity: 450L
Packing instruction (passenger aircraft)	Maximum Quantity: 450L
Special precautions for user:	A97, A158, A197

15. REGULATORY INFORMATION

U.S. Federal Regulations

TSCA	All components of this product are listed on US Toxic Substances Control Act (TSCA) Inventory considered as "existing" chemical substances in U.S. commerce.	
Clean Air Act Section 112(b)	CAS 822-06-0	Hexamethylene-di-isocyanate
Clean Air Act Section 602 Class I Substances, 602 Class II Substances	This product, in compliance with the Act, does not contain any substances regulated as pollutants.	
Clean Water Act Priority or/and Toxic Pollutants	This product, in compliance with the Act, does not contain any substances regulated as pollutants.	
DEA List I Chemicals (Precursor Chemicals) and List II Chemicals (Essential Chemicals)	No component(s) listed; in compliance with the List.	
EPA List of Lists 313 Category Code:	CAS 822-06-0	Hexamethylene-di-isocyanate
EPCRA 302 EHS TPQ	No component(s) listed; in compliance with the List.	
CERCLA RQ	CAS 822-06-0	Hexamethylene-di-isocyanate
EPCRA 313 TRI	CAS 822-06-0	Hexamethylene-di-isocyanate
RCRA Code	No component(s) listed; in compliance with the List.	
CAA 112 (r) TMP TQ	No component(s) listed; in compliance with the List.	

State Regulations

Massachusetts / Minnesota / New Jersey / New York / California

CAS 822-06-0 Hexamethylene-di-isocyanate

Pennsylvania:

This product, in compliance with the State Regulations, does not contain any substances or components listed.

CA Proposition 65:

This product does not contain any substances known to the State of California to cause cancer, reproductive harm, or birth defects.

16. OTHER INFORMATION

Text of hazard (H) indications mentioned in section 2-3 of the sheet:

H331	Toxic if inhaled.
H335	May cause respiratory irritation.
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H317	May cause an allergic skin reaction.

LEGEND:

313 CATEGORY CODE	Emergency Planning and Community Right-to Know Act Section 313 Category Code
ADR	European Agreement concerning the carriage of Dangerous goods by Road
CAA 112 (r) RMP TQ	Risk Management Plan Threshold Quantity (Clean Air Act Section 112(R))
CAS NUMBER	Chemical Abstract Service Number
CE50	Effective concentration (required to induce a 50% effect)

CERCLA RQ	Reportable Quantity (Comprehensive Environment Response, Compensation, and Liability Act)
CLP	EC Regulation 1272/2008
DEA	Drug Enforcement Administration
EmS	Emergency Schedule
EPA	US Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPCRA 302 EHS TPQ	Extremely Hazardous Substance Threshold Planning Quantity (Section 302 Category Code)
EPCRA 304 EHS RQ	Extremely Hazardous Substance Reportable Quantity (Section 304 Category Code)
EPCRA 313 TRI	Toxics Release Inventory (Section 313 Category Code)
GHS	Globally Harmonized System of classification and labeling of chemicals
IATA DGR	International Air Transport Association Dangerous Goods Regulation
IC50	Immobilization Concentration 50%
IMDG	International Maritime Code for dangerous goods
IMO	International Maritime Organization
LC50	Lethal Concentration 50%
LD50	Lethal Dose 50%
OEL	Occupational Exposure Level
PEL	Predicted Exposure Level
RCRA Code	Resource Conservation and Recovery Act Code
REL	Recommended Exposure Limit
RID	Regulation concerning the international transport of dangerous goods by train
TLV	Threshold Limit Value
TLV CEILING	Concentration that should not be exceeded during any time of occupational exposure.
TSCA	Toxic Substances Control Act
TWA STEL	Short-term Exposure Limit
TWA	Time-weighted Average Exposure Limit
VOC	Volatile Organic Compounds
WHMIS	Workplace Hazardous Materials Information System

GENERAL BIBLIOGRAPHY:

- GHS rev. 3
- The Merck Index. 10th Edition
- Handling Chemical Safety
- Niosh - Registry of Toxic Effects of Chemical Substances
- INRS - Fiche Toxicologique (toxicological sheet)
- Patty - Industrial Hygiene and Toxicology
- N.I. Sax - Dangerous properties of Industrial Materials-7, 1989 Edition
- ECHA website
- Database of SDS models for chemicals - Ministry of Health and ISS (Istituto Superiore di Sanità) - Italy
- 6 NYCRR part 597
- Cal/OSHA website
- California Safe Drinking Water and Toxic Enforcement Act
- EPA website
- Hazard Communication Standard (HCS 2012)
- IARC website
- List Of Lists EPA: Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112® of the Clean Air Act
- Massachusetts 105 CMR Department of public health 670.000: "Right to Know"
- Minnesota Chapter 5206 Department of Labor and Industry Hazardous Substances, Employee "Right to Know".
- New Jersey Worker and Community Right to know Act N.J.S.A.
- NTP. 2011. Report on Carcinogens, 12th Edition.
- OSHA website
- Pennsylvania, Hazardous Substance List, Chapter 323

NOTE FOR USERS:

The information contained in the present sheet are based on our own knowledge on the date of the last version. Users must verify the suitability and thoroughness of provided information according to each specific use of the product.

This document must not be regarded as a guarantee on any specific product property.

The use of this product is not subject to our direct control; therefore, users must, under their own responsibility, comply with the current health and safety laws and regulations. The producer is relieved from any liability arising from improper uses.

Purchasers must provide product users with adequate training on how to use chemical products.

ARMUS MAKES NO WARRANTIES EXPRESS OR IMPLIED AND ASSUMES NO LIABILITY ARISING FROM THIS INFORMATION OR ITS USE. ARMUS SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR CONSEQUENTIAL DAMAGES AND SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHT HELD BY OTHERS.

CALCULATION METHODS FOR CLASSIFICATION

Product classification derives from criteria established by the OSHA Hazard Communication Standard (HCS) (29 CFR 1910.1200), unless determined otherwise in Section 11 and 12.
The data for evaluation of chemical-physical properties are reported in section 9.

Changes to previous review:

The following sections were modified: 02 / 03 / 08 / 11 / 15.