MATERIAL SAFETY DATA SHEET

DEAHEUNG CHEMICAL CO., LTD. www.dhcbond.co.kr

Product Name	DE-S(A)

1. Product and Company Identification

A. Product Name: DE-S(A)

B. Recommended use of the chemical and restrictions on use

- Recommended use of the chemical: DE-S(A,B) is two component Epoxy resin base adhesive, bonding for metal, glass, pottery and concrete, etc.
- Restrictions on use of the product: Do not use for purposes other than adhesive.

C. Manufacturer/Supplier/Distributor Information

- Name: DAEHEUNG CHEMICAL CO., LTD.
- Address: 68, Sandan-ro 64beon-gil, Pyeongtaek-si, Gyeonggi-do, Korea
- Emergency phone number: 82-31-668-1424

2. Hazards identification

A. Hazard·Risk Classification

Skin corrosion / Irritation : Category 2

Serious eye damage / Lrritation : Category 2

Skin sensitization : Category 1

Target Organ Toxicity (Single Exposure) : Category 3(Respiratory tract irritation)

Target Organ Toxicity (Repeated Exposure) : Category 2

Aspiration hazard : category 2

B. Label elements including precautionary statements

- Symbol

- Signal Word: Danger
- Hazard·Risk Statement

H315 Causes skin irritation

H317 May cause an allergic skin reaction

H319 Causes serious eye irritation

H335 May cause respiratory irritation

H373 May cause damage to organs through prolonged or repeated exposure

H411 Toxic to aquatic life with long lasting effects

- Precautionary Statement

Prevention

P260 Do not breathe dust/fume/gas/mist/vapours/spray

P261 Avoid breathing dust/fume/gas/mist/vapours/spray

P264 Wash thoroughly after handling

P271 Use only outdoors or in a well-ventilated area

P272 Contaminated work clothing should not be allowed out of the workplace

P273 Avoid release to the environment

P280 Wear protective gloves/protective clothing/eye protection/face protection

Response

P302+P352 IF ON SKIN: Wash with soap and water

P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing

Response

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing

P312 Call a POISON CENTER or doctor/physician if you feel unwell

	P314 Get Medical advice/attention if you feel unwell
	P321 Specific treatment
	P332+P313 If skin irritation occurs: Get medical advice/attention
	P333+P313 If skin irritation or a rash occurs: Get medical advice/attention
	P337+P313 If eye irritation persists get medical advice/attention
	P362+P364 Take off contaminated clothing and wash before reuse
	P391 Collect spillage
Storage	P403+P233 Store in a well ventilated place. Keep container tightly closed
	P405 Store locked up
Disposal	P501 Dispose of contents/container to in accordance with local/regional/national/international regulation.

C. Other Hazard·Risk which are not included in the classification criteria (e.g. dust explosion hazard)

	BISPHENOL A-EPICHLOROHYDRIN RESIN	CARBONIC ACID, CALCIUM SALT
Health	2	2
Fire	0	1
Reactivity	0	0

3. Composition/Information on ingredients

Chemical Name	Other name	CAS number	Content(%)
BISPHENOL A-EPICHLOROHYDRIN RESIN	-	25068-38-6	30
CALCIUM CARBONATE	CARBONIC ACID, CALCIUM SALT	471-34-1	60
OTHER ADDITIVES	-	-	10

4. First aid measures

A. Eye contact	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing
	If eye irritation persists get medical advice/attention
B. Skin contact	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
	If skin irritation occurs: Get medical advice/attention
	Remove and isolate contaminated clothing and shoes.
	In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
	Shower and wash with soap and water.
C. Inhalation	Call a POISON CENTER or doctor/physician if you feel unwell
	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
	If not breathing, give artificial respiration.
	If breathing is difficult, give oxygen.
D. Ingestion	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
E. Indication of immediate medical attention and notes for physician	Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

5. Fire-Fighting measures

A. Suitable (and unsuitable) extinguishing media	Dry chemical, CO2, sand, earth, water spray or regular foam.
	Use dry sand or soil for suffocation.
B. Specific hazards arising from the chemical (e.g. nature of any hazardous combustion products)	Fire may produce irritating, corrosive and/or toxic gases.
	Containers may explode when heated.
	Some may burn but none ignite readily.

C. Special protective equipment and precautions for fire-fighters	Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
	Fight fire with normal precautions from a reasonable distance
	Dike far ahead of liquid spill for later disposal.
	Move containers from fire area if you can do it without risk.
	Firefighters should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes.
	Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
	ALWAYS stay away from tanks engulfed in fire.

6. Accidental release measures

A. Personal precautions, protective equipment and emergency procedures	Avoid breathing dust/fume/gas/mist/vapours/spray
	Immediately wipe spills and follow the precautions in the protective equipment section.
	Eliminate all ignition sources.
	Stop leak if you can do it without risk.
	Prevent dust formation
	Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
	Cover spill with plastic sheet or tarp to minimize spreading.
	Pay attention to materials and conditions to avoid
B. Environmental precautions and protective procedures	Prevent entry into waterways, sewers, basements or confined areas.
	Do not discharge into the environment.
C. Methods and materials for containment and cleaning up	Absorb liquid and wash contaminated areas with detergent and water.
	Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
	If there is a large amount of leakage, make a ditch away from the liquid leakage.
	Place the spilled material in a clean, dry container with a clean shovel, loosely close the container, and remove the container from the leaked area.
	In case of powder leakage, cover it with a plastic sheet to prevent diffusion and keep it dry
	For small spills, absorb with sand, non-combustible material and place in container.
	Collect spillage.

7. Handling and storage

A. Precautions for safe handling	Avoid breathing dust/fume/gas/mist/vapours/spray.
	Wash thoroughly after handling.
	Use only outdoors or in a well-ventilated area.
	Follow all MSDS/label precautions even after container is emptied because it may retain product residues.
	Do not bring contaminated clothing out of the workplace.
	Use care in handling/storage.
	Open the cap carefully before opening.
	Avoid prolonged or persistent skin contact.
	Pay attention to materials and conditions to avoid
	Work with engineering management and personal protective equipment
	Beware of high temperatures
B. Conditions for safe storage (including any incompatibilities)	Store in a well ventilated place. Keep container tightly closed

any incompatibilities)

Empty drums should be completely drained and properly blocked to immediately return them to the drum adjuster or place them properly.

8. Exposure controls & personal protection

A. Control parameters (e.g. occupational exposure limit values, biological limit values)

- Occupational exposure limit values

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	TWA - 10mg/m^3

- ACGIH limit values

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	No data available

- Biological limit values

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	No data available

B. Appropriate engineering controls

Use process isolation, local exhaust, or other engineering controls to control air levels below exposure limits.

If driving generates dust, fume or mist, ventilate to keep air pollution below the exposure limit.

For facilities that store or use this material, install face wash facilities and safety showers.

C. Personal protective equipment

- Respiratory protection

BISPHENOL A-EPICHLOROHYDRIN RESIN

Wear a respirator that has been certified by Occupational Safety and Health Agency for the physical and chemical properties of the gas / liquid being exposed.

For gas / liquid materials, the following respiratory protection is recommended: -Isolated front type gas mask (for organic compounds (for acid gas)) or sequestered type separate gas mask (for organic compounds (for acid gas for acid gas)) or direct type front gas mask (For organic compounds (for acid gases for acid gases) or for anti-gas masks (for organic compounds (for acid gases for acid gases)) or electric gas masks

If oxygen is insufficient (<19.5%), wear a breathing mask or self-contained breathing apparatus

CALCIUM CARBONATE

Wear a respirator that has been certified by the Korea Occupational Safety and Health Agency that conforms to the physical and chemical properties of the particulate matter being exposed.

If the exposure concentration is lower than 100mg / m3, wear an appropriate type of filter while wearing a respirator.

If the exposure concentration is lower than 250mg / m3, wear a loose-fitting hood / helmet-type electric respirator or a continuous flow dust mask with an appropriate type of filter.

If the exposure concentration is lower than 500mg / m3, wear a full- or motorized half-type or air-supply continuous flow / pressure-required half-sided respirator equipped with an appropriate filter.

If the exposure concentration is lower than 10000mg / m3, wear a front-type or helmet / hood-type, pressure-required air mask with an appropriate filter.

If the exposure concentration is lower than 100000mg / m3, wear a self-air supply type (SCBA) or pressure-required self air supply type (SCBA) respirator equipped with an appropriate filter.

- Eye protection: Wear eye protection/face protection.
- Hands protection: Wear proper chemical resistant gloves.
- Body protection: Wear proper Protective clothing.

9. Physical and chemical properties

A. Appearance	
Physical state	Paste
Color	Gray
B. Odour	Aromatic smell
C. Odour threshold	No data available
D. pH	No data available
E. Melting point/freezing point	No data available
F. Initial boiling point and boiling range	No data available
G. Flashing point	100 ℃
H. Evaporation rate	No data available
I. Flammability(solid, gas)	No data available
J. Upper/lower flammability or explosive limits	No data available
K. Vapor pressure	95mmHg(at 20℃)
L. Solubility	Solubility solvent
M. Vapor density	No data available
N. Relative density	1.4
O Partition coefficient:n-octanol/water	No data available
P. Auto-ignition temperature	300 ℃
Q. Decomposition temperature	No data available
R. Viscosity	100,000±50,000 cps
S. Formula mass	No data available

10. Stability and reactivity

A.Chemical stability and possibility of hazardous reactions	Containers may explode when heated. Some may burn but none ignite readily. Inhalation or contact with material may irritate or burn skin and eyes. Fire may produce irritating, corrosive and/or toxic gases. Inhalation of material can be harmful Inhalation of asbestos can damage the lungs Some liquids may produce vapors that cause dizziness and suffocation It can decompose at high temperature and generate toxic gas
B. Conditions to avoid	Heat, sparks, flames etc..
C. Incompatible materials	Combustible / reducing materials.
D. Hazardous decomposition products	Fire may produce irritating, corrosive and/or toxic gases. Corrosive / toxic fume

11. Toxicological information

A. Information on the likely routes of exposure

May irritate eyes. May irritate skin. May cause respiratory tract irritation.

B. Health hazards information

- Acute toxic

Oral

BISPHENOL A-EPICHLOROHYDRIN RESIN	LD50 > 1000 ㎎/㎏ Rat
CALCIUM CARBONATE	LD50 6450 ㎎/㎏ Rat

Dermal

BISPHENOL A-EPICHLOROHYDRIN RESIN	LD50 > 20000 ㎎/㎏ Rabbit
CALCIUM CARBONATE	No data available

Inhalation

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	No data available

- Skin corrosive/irritant

BISPHENOL A-EPICHLOROHYDRIN RESIN	The moderate irritation was observed in the application test on rabbit skin. (in CERI Hazard Data (2002))
	European Union Directive 7 amendment annex 1 classification R43 (may cause irritability by skin contact)
	Moderate irritation at rabbit (STANDARD DRAIZE TEST)
CALCIUM CARBONATE	Moderate irritation at rabbit (STANDARD DRAIZE TEST), show a irritation to human

- Serious eye damage/eye irritation

BISPHENOL A-EPICHLOROHYDRIN RESIN	Based on the description in the report on the rabbit eye irritation tests (CERI Hazard Data 2001-67 (2002))
	Moderate irritation at rabbit (STANDARD DRAIZE TEST)
CALCIUM CARBONATE	Extreme irritation of the Rabbit -Draize test, show a slight irritation to human

- Respiratory sensitization

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	No data available

- Skin sensitization

BISPHENOL A-EPICHLOROHYDRIN RESIN	European Union Directive 7 amendment annex 1 classification R43 (may cause irritability by skin contact)
CALCIUM CARBONATE	No data available

- Carcinogenicity

Occupational Health and Safety Act

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	No data available

Ministry of Employment and Labor Notice

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	No data available

IARC

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	No data available

OSHA

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	No data available

ACGIH

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	No data available

NTP

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	No data available

EU CLP

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	No data available

- Germ Cell Mutagenicity

BISPHENOL A-EPICHLOROHYDRIN RESIN	- In vitro CHL cells, Ambassador over test positive without activation and metabolic acid vital to activate the voice In the test. - Salmonella typhimurium tests positive.
CALCIUM CARBONATE	Salmonella typhimurium assay (Ames test) (Bacterial Reverse Mutation Assay): negative

- Reproductive toxicity

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	No data available

- Specific target organ toxicity (single exposure)

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	May cause respiratory irritation.

- Specific target organ toxicity (repeated exposure)

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	Causes blood system disorders, gastrointestinal disorders, and hormonal disorders by exposure

- Aspiration hazard

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	No data available

12. Ecological information

A. Aquatic and terrestrial ecotoxicity

- Fish

BISPHENOL A-EPICHLOROHYDRIN RESIN	LC50 1.41 ㎎/ℓ 96 hr Oryzias latipes
CALCIUM CARBONATE	LC50 > 56000 ㎎/ℓ 96 hr

- Shellfish

BISPHENOL A-EPICHLOROHYDRIN RESIN	EC50 1.7 ㎎/ℓ 48 hr
CALCIUM CARBONATE	No data available

- Birds

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	EC50 22000 ㎎/ℓ 96 hr

B. Persistence and degradability

- Persistence

BISPHENOL A-EPICHLOROHYDRIN RESIN	log Kow 2.821
CALCIUM CARBONATE	No data available

- Resolvability

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	No data available

C. Bioaccumulative potential

- Concentration

BISPHENOL A-EPICHLOROHYDRIN RESIN	BCF 0.56 ~ 0.67
CALCIUM CARBONATE	BCF 3.162

- Bio resolvability

BISPHENOL A-EPICHLOROHYDRIN RESIN	0 (%) 28 day
CALCIUM CARBONATE	No data available

D. Mobility in soil

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	No data available

E. Other adverse effects

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	No data available

13. Disposal considerations

A. Disposal method	Dispose according to the related regulations. Incinerate or dispose of in a licensed facility. Do not discharge substance/product into sewer system.
B. Disposal precaution	Follow details of related waste managament act.

14. Transport information

A. UN number	1133
B. UN proper shipping name	ADHESIVES(Containing a flammable liquid)
C. Transport hazard class	3
D. Packing group (if applicable)	III
E. Marin pollution (yes/no)	Yes (BISPHENOL A-EPICHLOROHYDRIN RESIN)

F. Special precaution which a user to be aware of or needs to comply with in connection with transport or conveyance either within or outside their premises

- Emergency procedure at fire	F-A
- Emergency procedure at leakages	S-F

15. Regulatory information

A. Industrial Safety and Health Act

BISPHENOL A-EPICHLOROHYDRIN RESIN	No data available
CALCIUM CARBONATE	Exposure limits set material
	Substances to be measured in the working environment (measurement cycle: other mineral dust)
	Substances subject to special medical examination (diagnosis cycle: mineral dust)

B. Toxic Chemical Control Act	No data available
C. Dangerous Material Safety Control Act	Not applicable(Non-dangerous goods)
D. Wastes Management Act	Designated Wastes

E. Other requirements in domestic and other countries

- Domestic regulation

Persistent Organic Pollutant Control Act

BISPHENOL A-EPICHLOROHYDRIN RESIN	Not applicable
CALCIUM CARBONATE	Not applicable

- Other countries

USA(OSHA)

BISPHENOL A-EPICHLOROHYDRIN RESIN	Not applicable
CALCIUM CARBONATE	Not applicable

USA(CERCLA)

BISPHENOL A-EPICHLOROHYDRIN RESIN	Not applicable
CALCIUM CARBONATE	Not applicable

USA(EPCRA 302)

BISPHENOL A-EPICHLOROHYDRIN RESIN	Not applicable
CALCIUM CARBONATE	Not applicable

USA(EPCRA 304)

BISPHENOL A-EPICHLOROHYDRIN RESIN	Not applicable
CALCIUM CARBONATE	Not applicable

USA(EPCRA 313)

BISPHENOL A-EPICHLOROHYDRIN RESIN	Not applicable
CALCIUM CARBONATE	Not applicable

USA (Rotterdam Convention material)

BISPHENOL A-EPICHLOROHYDRIN RESIN	Not applicable
CALCIUM CARBONATE	Not applicable

USA (Stockholm Convention material)

BISPHENOL A-EPICHLOROHYDRIN RESIN	Not applicable
CALCIUM CARBONATE	Not applicable

USA (Substance Montreal Protocol)

BISPHENOL A-EPICHLOROHYDRIN RESIN	Not applicable
CALCIUM CARBONATE	Not applicable

EU (Classification)

BISPHENOL A-EPICHLOROHYDRIN RESIN	Xi; R36/38R43N; R51-53
CALCIUM CARBONATE	Not applicable

EU (Risk Phrases)

BISPHENOL A-EPICHLOROHYDRIN RESIN	R36/38, R43, R51/53
CALCIUM CARBONATE	Not applicable

EU (Safety Phrases)

BISPHENOL A-EPICHLOROHYDRIN RESIN	S2, S28, S37/39, S61
CALCIUM CARBONATE	Not applicable

16. Other information

A. Information source and references

BISPHENOL A-EPICHLOROHYDRIN RESIN

Corporate Solution From Thomson Micromedex(http://csi.micromedex.com)(Information on the likely routes of exposure)

National Library of Medicine(NLM)(http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?CHEM)(Oral)

National Library of Medicine(NLM)(http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?CHEM)(Dermal)

Corporate Solution From Thomson Micromedex(http://csi.micromedex.com)(Skin corrosive/irritant)

European chemical Substances Information System(ECB-ESIS)(http://ecb.jrc.it/esis)(Skin corrosive/irritant)

National Institute of Technology and Evaluation(NITE)(http://www.safe.nite.go.jp/ghs/h18_bunrui.html)(Skin corrosive/irritant)

Corporate Solution From Thomson Micromedex(http://csi.micromedex.com)(Serious eye damage/eye irritation)

National Institute of Technology and Evaluation(NITE)(http://www.safe.nite.go.jp/ghs/h18_bunrui.html)(Serious eye damage/eye irritation)

European chemical Substances Information System(ECB-ESIS)(http://ecb.jrc.it/esis)(Skin sensitization)

National Library of Medicine/Chemical Carcinogenesis Research Information System(NLM/CCRIS)(http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?CCRIS)(Germ Cell Mutagenicity)

National Library of Medicine/genetic toxicology(NLM/GENETOX)(http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?GENETOX)(Germ Cell Mutagenicity)

National Institute of Technology and Evaluation(NITE)(http://www.safe.nite.go.jp/ghs/h18_bunrui.html)(Fish)

NITE(Shellfish)

National Institute of Technology and Evaluation(NITE)(http://www.safe.nite.go.jp/ghs/h18_bunrui.html)(Persistence)

National Institute of Technology and Evaluation(NITE)(http://www.safe.nite.go.jp/ghs/h18_bunrui.html)(Concentration)

National Institute of Technology and Evaluation(NITE)(http://www.safe.nite.go.jp/ghs/h18_bunrui.html)(Bio resolvability)

Corporate Solution From Thomson Micromedex(http://csi.micromedex.com)

CALCIUM CARBONATE

International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(Oral)

International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(Skin corrosive/irritant)

International Uniform ChemicaL Information Database(IUCLID)(Serious eye demage/eye irritation)

National Library of Medicine/Chemical Carcinogenesis Research Information System(NLM/CCRIS)(http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?CCRIS)(Germ Cell Mutagenicity)

ECOTOX(Oral)

Ecological Structure Activity Relationships(ECOSAR)(Bird)

Quantitative Structure Activity Relation(QSAR)(Concentration)

Quantitative Structure Activity Relation(QSAR)(Mobility in soil)

The Chemical Database, The Department of Chemistry at the University of Akron(http://ull.chemistry.uakron.edu/erd)

Source of data : Korea Occupational Safety and Health Agency (KOSHA)>

B. Issuing date	March 30, 2020
C. Revision number and date	
Revision number	1
Date	May 31, 2022
D. Others	

MATERIAL SAFETY DATA SHEET

DEAHEUNG CHEMICAL CO., LTD. www.dhcbond.co.kr

Product Name	DE-S(B)

1. Product and Company Identification

A. Product Name: DE-S(B)

B. Recommended use of the chemical and restrictions on use

- Recommended use of the chemical: DE-S(A,B) is two component Epoxy resin base adhesive, bonding for metal, glass, pottery and concrete, etc.
- Restrictions on use of the product: Do not use for purposes other than adhesive.

C. Manufacturer/Supplier/Distributor Information

- Name: DAEHEUNG CHEMICAL CO., LTD.
- Address: 68, Sandan-ro 64beon-gil, Pyeongtaek-si, Gyeonggi-do, Korea
- Emergency phone number: 82-31-668-1424

2. Hazards identification

A. Hazard·Risk Classification

Acute toxicity (dermal) : Categories 3

Acute toxicity (inhalation:vapor) : Categories 1

Skin corrosion / Irritation : Category 1

Serious eye damage / Irritation : Category 1

Respiratory sensitization : Category 1

Skin sensitization : Category 1

Reproductive toxicity : Categories 1B

Target Organ Toxicity (Single Exposure) : Category 3(Respiratory tract irritation)

Target Organ Toxicity (Repeated Exposure) : Category 2

B. Label elements including precautionary statements

- Symbol

- Signal Word: Danger
- Hazard·Risk Statement

H311 Toxic in contact with skin

H314 Causes severe skin burns and eye damage

H317 May cause an allergic skin reaction

H318 Causes serious eye damage

H330 Fatal if inhaled

H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled

H335 May cause respiratory irritation

H360 May damage fertility or the unborn child

H373 May cause damage to organs through prolonged or repeated exposure

- Precautionary Statement

Prevention: P201 Obtain special instructions before use

	P202 Do not handle until all safety precautions have been read and understood
	P260 Do not breathe dust/fume/gas/mist/vapours/spray
	P261 Avoid breathing dust/fume/gas/mist/vapours/spray
	P264 Wash thoroughly after handling
Prevention	P271 Use only outdoors or in a well-ventilated area
	P272 Contaminated work clothing should not be allowed out of the workplace
	P280 Wear protective gloves/protective clothing/eye protection/face protection
	P281 Use personal protective equipment as required
	P284 Wear respiratory protection
	P285 In case of inadequate ventilation wear respiratory protection
Response	P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
	P302+P352 IF ON SKIN: Wash with soap and water
	P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
	P304+P340 IF INHALED Remove victim to fresh air and keep at rest in a position comfortable for breathing
	P304+P341 IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing
	P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do - continue rinsing
	P308+P313 IF exposed or concerned: Get medical advice/attention
	P310 Immediately call a POISON CENTER or doctor/physician
	P312 Call a POISON CENTER or doctor/physician if you feel unwell
	P314 Get Medical advice/attention if you feel unwell
	P320 Specific treatment is urgent
	P321 Specific treatment
	P322 Take appropriate measures.
	P333+P313 If skin irritation or a rash occurs: Get medical advice/attention
	P342+P311 If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician
	P362+P364 Take off contaminated clothing and wash before reuse.
Storage	P403+P233 Store in a well ventilated place. Keep container tightly closed
	P405 Store locked up
Disposal	P501 Dispose of contents/container to in accordance with local/regional/national/international regulation.

C. Other Hazard·Risk which are not included in the classification criteria (e.g. dust explosion hazard)

	POLYAMIDE	CALCIUM CARBONATE	DIETHYLENE TRIAMINE
Health	2	2	3
Fire	1	0	1
Reactivity	0	0	0

3. Composition/Information on ingredients

Chemical Name	Other name	CAS number	Content(%)
DIETHYLENETRIAMINE	Diethylenetriamine	111-40-0	15
CALCIUM CARBONATE	CARBONIC ACID, CALCIUM SALT	471-34-1	50
POLYAMIDE RESIN	POLYAMIDE RESIN C	88384-96-7	25
OTHER ADDITIVES	-	-	10

4. First aid measures

A. Eye contact	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing
	If eye irritation persists get medical advice/attention
B. Skin contact	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
	If skin irritation occurs: Get medical advice/attention
	Remove and isolate contaminated clothing and shoes.
	For hot substances, soak or wash affected areas with plenty of cold water to dissipate heat.
	Prevent the spread of contaminated areas in case of minor skin contact
C. Inhalation	Call a POISON CENTER or doctor/physician if you feel unwell
	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
	If exposed to excessive dust or fume, remove with clean air and take medical measures if you have cough or other symptoms.
D. Ingestion	Rinse mouth. Do NOT induce vomiting
	If exposed or concerned, seek medical attention / advice.
	Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
E. Indication of immediate medical attention and notes for physician	Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

5. Fire-Fighting measures

A. Suitable extinguishing media	Dry chemical, CO_2, sand, earth, water spray or regular foam.
	Use dry sand or soil for suffocation.
B. Specific hazards arising from the chemical (e.g. nature of any hazardous combustion products)	Fire may produce irritating, corrosive and/or toxic gases.
	Containers may explode when heated.
	Some may burn but none ignite readily.
C. Special protective equipment and precautions for fire-fighters	Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
	Fight fire with normal precautions from a reasonable distance
	Dike far ahead of liquid spill for later disposal.
	Move containers from fire area if you can do it without risk.
	Cool the container with plenty of water after the fire has extinguished in the event of a tank fire.
	Firefighters should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes.
	Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
	ALWAYS stay away from tanks engulfed in fire.

6. Accidental release measures

A. Personal precautions, protective equipment and emergency procedures	Avoid breathing dust/fume/gas/mist/vapours/spray
	Immediately wipe spills and follow the precautions in the protective equipment section.
	Isolate the contaminated area.
	Eliminate all ignition sources
	Stop leak if you can do it without risk.
	Do not enter if you do not need to enter or do not have protective equipment.
	Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

	Cover spill with plastic sheet or tarp to minimize spreading.
	Pay attention to materials and conditions to avoid
B. Environmental precautions and protective procedures	Prevent entry into waterways, sewers, basements or confined areas.
C. Methods and materials for containment and cleaning up	
	Absorb spills with inert materials (eg dry sand or soil) and place in chemical waste containers.
	Remove airborne dust and moisten with water to prevent scattering.
	Absorb liquid and wash contaminated areas with detergent and water.

7. Handling and storage

A. Precautions for safe handling	Do not handle until all safety precautions have been read and understood
	Avoid breathing dust/fume/gas/mist/vapours/spray.
	Wash thoroughly after handling
	Use only outdoors or in a well-ventilated area.
	Follow all MSDS/label precautions even after container is emptied because it may retain product residues.
	Do not bring contaminated clothing out of the workplace.
	Use care in handling/storage.
	Avoid breathing dust/fume/gas/mist/vapours/spray.
	Open the cap carefully before opening.
	Avoid prolonged or persistent skin contact.
	Pay attention to materials and conditions to avoid
B. Conditions for safe storage (including any incompatibilities)	Empty drums should be completely drained and properly blocked to immediately return them to the drum adjuster or place them properly.
	Store in a well ventilated place. Keep container tightly closed

8. Exposure controls & personal protection

A. Control parameters (e.g. occupational exposure limit values, biological limit values)

- Occupational exposure limit values

DIETHYLENETRIAMINE	TWA - 1ppm 4mg/m^3
CALCIUM CARBONATE	TWA - 10mg/m^3
POLYAMIDE RESIN	No data available

- ACGIH limit values

DIETHYLENETRIAMINE	TWA 1 ppm
CALCIUM CARBONATE	No data available
POLYAMIDE RESIN	No data available

- Biological limit values

DIETHYLENETRIAMINE	No data available
CALCIUM CARBONATE	No data available
POLYAMIDE RESIN	No data available

B. Appropriate engineering controls	Use process isolation, local exhaust, or other engineering controls to control air levels below exposure limits.
	If driving generates dust, fume or mist, ventilate to keep air pollution below the exposure limit.
	For facilities that store or use this material, install face wash facilities and safety showers.
C. Personal protective equipment	
- Respiratory protection	The filter class must be suitable for the maximum contaminant concentration(gas/vapour/aerosol/particulates) that may arise when handling the product.
- Eye protection	Wear eye protection/face protection.
- Hands protection	Wear proper chemical resistant gloves.
- Body protection	Wear proper Protective clothing.

9. Physical and chemical properties

A. Appearance	
Physical state	Paste
Color	Ivory
B. Odour	Aromatic smell
C. Odour threshold	No data available
D. pH	No data available
E. Melting point/freezing point	No data available
F. Initial boiling point and boiling range	No data available
G. Flashing point	100 ℃
H. Evaporation rate	No data available
I. Flammability(solid, gas)	No data available
J. Upper/lower flammability or explosive limits	No data available
K. Vapor pressure	95mmHg(at 20℃)
L. Solubility	Solubility solvent
M. Vapor density	No data available
N. Relative density	1.4
O Partition coefficient:n-octanol/water	No data available
P. Auto-ignition temperature	300 ℃
Q. Decomposition temperature	No data available
R. Viscosity	100,000±20,000cps
S. Formula mass	No data available

10. Stability and reactivity

A.Chemical stability and possibility of hazardous reactions	Flammable liquid and vapour
	Those substances designated with a (P) may polymerize explosively when heated or involved in a fire.
	Containers may explode when heated.
	Contact with metals may evolve flammable hydrogen gas.
	Some are oxidizers and may ignite combustibles (wood, paper, oil, clothing, etc.).
	TOXIC; inhalation, ingestion or skin contact with material may cause severe injury or death.
	Contact with substance may cause severe burns to skin and eyes.
	Fire may produce irritating, corrosive and/or toxic gases.
	Fire may produce irritating, corrosive and/or toxic gases.
	Vapor explosion and poison hazard indoors, outdoors or in sewers.
	Liquide may cause dizziness or asphyxiation.
B. Conditions to avoid	Keep away from heat/sparks/open flames/hot surfaces - No smoking
C. Incompatible materials	Combustible materials, reducing materials, metal.
D. Hazardous decomposition products	Fire may produce irritating, corrosive and/or toxic gases.
	Corrosive / toxic fume

11. Toxicological information

A. Information on the likely routes of exposure	No data available
B. Health hazards information	
- Acute toxic	
Oral	
DIETHYLENETRIAMINE	LD50 1080 ㎎/㎏ Rat
CALCIUM CARBONATE	LD50 6450 ㎎/㎏ Rat
POLYAMIDE RESIN	No data available
Dermal	

DIETHYLENETRIAMINE LD50 672 ㎎/㎏ Rabbit

CALCIUM CARBONATE No data available

POLYAMIDE RESIN No data available

Inhalation

DIETHYLENETRIAMINE LC50 170 ppm 4 hr Rat

CALCIUM CARBONATE No data available

POLYAMIDE RESIN No data available

- Skin corrosive/irritant

DIETHYLENETRIAMINE Based on data on human health effects (MOE Risk Assessment vol. 2 (2003), CERI-NITE Hazard Assessment No.50 (2004)) and the testing data of rabbit skin irritation tests (CERI-NITE Hazard Assessment No.50 (2004), SIDS (1996)) (administration of the undiluted solution shows "corrosiveness")

CALCIUM CARBONATE Moderate irritation at rabbit (STANDARD DRAIZE TEST), show a irritation to human

POLYAMIDE RESIN It causes skin irritation

- Serious eye damage/eye irritation

DIETHYLENETRIAMINE Based on data on human health effects (MOE Risk Assessment Vol. 2 (2003), ACGIH (7th, 2001)) and the testing data of rabbit eye irritation tests (CERI-NITE Hazard Assessment No.50 (2004), SIDS (1996)) ("corrosive," "highly corrosive," and "loss of vision").

CALCIUM CARBONATE Extreme irritation of the Rabbit -Draize test, show a slight irritation to human

POLYAMIDE RESIN It causes eye irritation

- Respiratory sensitization

DIETHYLENETRIAMINE Based on data on human health effects (MOE Risk Assessment vol. 2 (2003), CERI-NITE Hazard Assessment No.50 (2004), SIDS (1996), ACGIH (7th, 2001))

CALCIUM CARBONATE No data available

POLYAMIDE RESIN No data available

- Skin sensitization

DIETHYLENETRIAMINE Based on the testing data of guinea pig skin sensitization tests (based on the Maximization method) (CERI-NITE Hazard Assessment No.50 (2004), SIDS (1996)) and data on human health effects (MOE Risk Assessment Vol. 2 (2003), CERI-NITE Hazard Assessment No.50 (2004), SIDS (1996), ACGIH 7th (2001)).

CALCIUM CARBONATE No data available

POLYAMIDE RESIN No data available

- Carcinogenicity

Occupational Health and Safety Act

DIETHYLENETRIAMINE No data available

CALCIUM CARBONATE No data available

POLYAMIDE RESIN No data available

Ministry of Employment and Labor Notice

DIETHYLENETRIAMINE No data available

CALCIUM CARBONATE No data available

POLYAMIDE RESIN No data available

IARC

DIETHYLENETRIAMINE No data available

CALCIUM CARBONATE No data available

POLYAMIDE RESIN No data available

OSHA

DIETHYLENETRIAMINE No data available

CALCIUM CARBONATE No data available

POLYAMIDE RESIN No data available

ACGIH

DIETHYLENETRIAMINE No data available

CALCIUM CARBONATE	No data available
POLYAMIDE RESIN	No data available

NTP

DIETHYLENETRIAMINE	No data available
CALCIUM CARBONATE	No data available
POLYAMIDE RESIN	No data available

EU CLP

DIETHYLENETRIAMINE	No data available
CALCIUM CARBONATE	No data available
POLYAMIDE RESIN	No data available

- Germ Cell Mutagenicity

DIETHYLENETRIAMINE	Based on the absence of data on multi-generation mutagenicity tests and germ cell mutagenicity tests in vivo and negative data on somatic cell mutagenicity tests in vivo (micronucleous tests), described in NITE Initial Risk Assessment No. 50 (2005), ATSDR (1996).
CALCIUM CARBONATE	Salmonella typhimurium assay (Ames test) (Bacterial Reverse Mutation Assay): negative
POLYAMIDE RESIN	No data available

- Reproductive toxicity

DIETHYLENETRIAMINE	Based on the description in NITE Initial Risk Assessment No.50 (2005): The results of rat developmental toxicity studies (OECD TG 421) suggest adverse effects on reproductive/developmental functions at dose levels not toxic to parent animals.
CALCIUM CARBONATE	No data available
POLYAMIDE RESIN	No data available

- Specific target organ toxicity (single exposure)

DIETHYLENETRIAMINE	No data available
CALCIUM CARBONATE	May cause respiratory irritation.
POLYAMIDE RESIN	May cause respiratory irritation.

- Specific target organ toxicity (repeated exposure)

DIETHYLENETRIAMINE	No data available
CALCIUM CARBONATE	Causes blood system disorders, gastrointestinal disorders, and hormone disorders due to exposure
POLYAMIDE RESIN	No data available

- Aspiration hazard

DIETHYLENETRIAMINE	No data available
CALCIUM CARBONATE	No data available
POLYAMIDE RESIN	No data available

12. Ecological information

A. Aquatic and terrestrial ecotoxicity

- Fish

DIETHYLENETRIAMINE	No data available
CALCIUM CARBONATE	LC50 > 56000 ㎎/ℓ 96 hr
POLYAMIDE RESIN	No data available

- Shellfish

DIETHYLENETRIAMINE	EC50 16 ㎎/ℓ 48 hr
CALCIUM CARBONATE	No data available
POLYAMIDE RESIN	No data available

- Birds

DIETHYLENETRIAMINE	No data available
CALCIUM CARBONATE	EC50 22000 ㎎/ℓ 96 hr
POLYAMIDE RESIN	No data available

B. Persistence and degradability

- Persistence

DIETHYLENETRIAMINE	log Kow -1.3
CALCIUM CARBONATE	No data available
POLYAMIDE RESIN	No data available

- Resolvability

DIETHYLENETRIAMINE	No data available
CALCIUM CARBONATE	No data available
POLYAMIDE RESIN	No data available

C. Bioaccumulative potential

- Concentration

DIETHYLENETRIAMINE	No data available
CALCIUM CARBONATE	BCF 3.162
POLYAMIDE RESIN	No data available

- Bio resolvability

DIETHYLENETRIAMINE	No data available
CALCIUM CARBONATE	No data available
POLYAMIDE RESIN	No data available

D. Mobility in soil

DIETHYLENETRIAMINE	No data available
CALCIUM CARBONATE	No data available
POLYAMIDE RESIN	No data available

E. Other adverse effects

DIETHYLENETRIAMINE	No data available
CALCIUM CARBONATE	No data available
POLYAMIDE RESIN	No data available

13. Disposal considerations

A. Disposal method	1) Incinerate. 2) If it is difficult to incinerate, crush, cut or melt to a size less than or equal to 15 centimeters in size, and then embed it in a managed landfill facility that can embed designated waste. Dispose according to the related regulations.
B. Disposal precaution	Follow details of related waste managament act.

14. Transport information

A. UN number	Not classified as a dangerous good under transport regulations
B. UN proper shipping name	No data available
C. Transport hazard class	No data available
D. Packing group (if applicable)	No data available
E. Marin pollution (yes/no)	No data available

F. Special precaution which a user to be aware of or needs to comply with in connection with transport or conveyance either within or outside their premises

- Emergency procedure at fire	No data available
- Emergency procedure at leakages	No data available

15. Regulatory information

A. Industrial Safety and Health Act

DIETHYLENETRIAMINE	Management harmful agents
	Working environment measurement target material(measurement period: 6 months)
	Special medical examination the substance(diagnostic period: 12 months)
	Exposure limits set material
CALCIUM CARBONATE	Exposure limits set material

POLYAMIDE RESIN No data available

B. Toxic Chemical Control Act No data available

C. Dangerous Material Safety Control Act Not applicable(Non-dangerous goods)

D. Wastes Management Act Designated Wastes

E. Other requirements in domestic and other countries

- Domestic regulation

Persistent Organic Pollutant Control Act

DIETHYLENETRIAMINE Not applicable

CALCIUM CARBONATE Not applicable

POLYAMIDE RESIN Not applicable

- Other countries

USA(OSHA)

DIETHYLENETRIAMINE Not applicable

CALCIUM CARBONATE Not applicable

POLYAMIDE RESIN Not applicable

USA(CERCLA)

DIETHYLENETRIAMINE Not applicable

CALCIUM CARBONATE Not applicable

POLYAMIDE RESIN Not applicable

USA(EPCRA 302)

DIETHYLENETRIAMINE Not applicable

CALCIUM CARBONATE Not applicable

POLYAMIDE RESIN Not applicable

USA(EPCRA 304)

DIETHYLENETRIAMINE Not applicable

CALCIUM CARBONATE Not applicable

POLYAMIDE RESIN Not applicable

USA(EPCRA 313)

DIETHYLENETRIAMINE Not applicable

CALCIUM CARBONATE Not applicable

POLYAMIDE RESIN Not applicable

USA (Rotterdam Convention material)

DIETHYLENETRIAMINE Not applicable

CALCIUM CARBONATE Not applicable

POLYAMIDE RESIN Not applicable

USA (Stockholm Convention material)

DIETHYLENETRIAMINE Not applicable

CALCIUM CARBONATE Not applicable

POLYAMIDE RESIN Not applicable

USA (Substance Montreal Protocol)

DIETHYLENETRIAMINE Not applicable

CALCIUM CARBONATE Not applicable

POLYAMIDE RESIN Not applicable

EU (Classification)

DIETHYLENETRIAMINE Xn; R21/22C; R34R43

CALCIUM CARBONATE Not applicable

POLYAMIDE RESIN Not applicable

EU (Risk Phrases)

DIETHYLENETRIAMINE R21/22, R34, R43

CALCIUM CARBONATE Not applicable

POLYAMIDE RESIN Not applicable

EU (Safety Phrases)

DIETHYLENETRIAMINE	S1/2, S26, S36/37/39, S45
CALCIUM CARBONATE	Not applicable
POLYAMIDE RESIN	Not applicable

16. Other information

A. Information source and references

DIETHYLENETRIAMINE

ACGIH(Oral)

SIDS(1996)(Dermal)

SIDS(1996)(Shellfish)

ICSC(Persistence)

CALCIUM CARBONATE

International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(Oral)

International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(Skin corrosive/irritant)

International Uniform ChemicaL Information Database(IUCLID)(Serious eye damage or eye irritation)

National Library of Medicine/Chemical Carcinogenesis Research Information System(NLM/CCRIS)
(http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?CCRIS)(Germ Cell Mutagenicity)

ECOTOX(Fish)

Ecological Structure Activity Relationships(ECOSAR)(Bird)

Quantitative Structure Activity Relation(QSAR)(Concentration)

Quantitative Structure Activity Relation(QSAR)(Mobility in soil)

The Chemical Database, The Department of Chemistry at the University of Akron
(http://ull.chemistry.uakron.edu/erd)

POLYAMIDE RESIN

Source of data : Korea Occupational Safety and Health Agency (KOSHA)>

B. Issuing date March 30, 2020

C. Revision number and date

Revision number	1
Date	May 31, 2022

D. Others