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The following MSDS included following products;

Cat. No	Product description
111-226	Exfection™ Plasmid LE midi [26preps]
111-201	Exfection™ Plasmid LE midi [100preps]
111-202	Exfection™ Plasmid LE midi sample [2preps]

MATERIAL SAFETY DATA SHEET

Product Name

Buffer P1

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Product name Buffer P1

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

Use of the substance or mixture Laboratory chemicals

1.3 Details of the supplier of the safety data sheet

Name GENEALL BIOTECHNOLOGY CO., LTD
 Address GeneAll Bldg., 303-7, Dongnam-ro, Songpa-gu, Seoul, 05729, Korea
 Information contact <+82-2-407-0096
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2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 [CLP/GHS]

This product is NOT classified as regulated substance and NOT subject to label elements.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 [CLP/GHS]

Hazard pictograms No data available
 Signal word No data available
 Hazardous statements No data available
 Precautionary statements
 Prevention No data available
 Response No data available
 Storage No data available
 Disposal No data available

2.3 Other Non-GHS Classification

No data available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance name	CAS No.	Concentration (%)
EDTA, DISODIUM DIHYDRATE	6381-92-6	0.01~0.05
TRIS	77-86-1	0.005~0.01

4. FIRST AID MEASURES

4.1 Description of first aid measures

General informations Notify doctor/physician about the substance to take necessary actions.
 Following eye contact Immediately flush the eyes with water for minutes. Remove contact lense, if possible. Keep washing. Get medical advice/attention, if symtom persists.
 Following skin contact If the material is hot, immerse or wash the affected area with a large amount of cold water to remove the heat. Get emergency medical attention. Remove contaminated clothing and footwear and isolate contaminated areas. In case of contact with substance, flush the skin immediately with water for at least 20 minutes. In case of minor skin contact, prevent the spread of contamination. If skin irritation occurs, take medical advice or attention. Remove contaminated clothing and wash before reusing.
 Following inhalation If exposed to excessive dust or fumes, remove them with clean air. Seek medical attention, if you experience coughing or other symptoms. Move to an area with fresh air. If breathing has stopped, perform artificial respiration. If breathing is difficult, provide oxygen. Keep the person warm and comfortable.

MATERIAL SAFETY DATA SHEET

Product Name	Buffer P1
Following ingestion	Get medical advice/attention.

5. FIRE FIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Use alcohol foam, carbon dioxide, or water spray.
Use dry sand or soil for smothering fires.

5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting

Highly toxic gases can be generated by pyrolysis or combustion during burning.
If heated, containers may explode.
Some may combust but does not ignite easily.
It's not flammability, but if heated, it may decompose to cause corrosive/toxic fumes.

5.3 Precautions for fire-fighters

Special protective equipment for firefighters

Wear appropriate protective apparatus.
Extinguish the fire from a safe distance away from the area.
Be aware that it may be transported in a melted form.
Be aware that some may be transported at high temperatures.
Dig a ditch for the disposal of the fire fighting water and keep the material from dispersing.
Move the containers from fire, if not dangerous.
In case of tank fire:
Extinguish it away from maximum distance or use unmanned fire extinguisher.
Keep cooling the container with a large amount of water even after the fire is out.
If there's a high pitched noise or change of color, keep away immediately.
Keep away from the tank covered in flames.
Use unmanned fire extinguishing equipment, and if it's unavailable, just let it burn.

5.4 Further information

No information available.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions

Clean spills and see section 5.3.
Remove all ignition sources.
If it's not dangerous, stop the leak.
Avoid contact without proper protective apparatus.
Cover with plastic sheet to prevent spread.
Avoid formation of dust.
Note the substances and conditions to avoid.
Avoid breathing dust/fume/gas/mist/vapours/spray

6.2 Environmental precautions

Environmental precautions

Avoid spread into waterway, sewers, drains, or confined areas.
Do not release to the environment.

6.3 Methods and material for containment and cleaning up

Method for cleaning up

Soak up with inert absorbent material(e.g. dry sand or soil), and place into the containers for chemical waste.
Absorb the liquid and wash off the contaminated area with detergent and water.
(large leaks) Make a ditch keeping distance from the leaks.
Use a clean shovel to place the spilled material into a clean, dry container. Loosely close the container and move it away from the spill area.
(powder leaks) Cover with plastic sheet to prevent spread and keep dry.
(small leaks) Absorb it with sand or an inert material and place it into a container.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

MATERIAL SAFETY DATA SHEET

Product Name	Buffer P1
Advice on safe handling	<p>Empty containers may retain product residue and can be hazardous. Follow all MSDS/label precautions. Carefully open the cap. Avoid prolonged or continuous skin contact. Be aware of the substances and conditions to avoid. See section 8 for exposure controls and protective equipment. Be cautious of high temperatures. Avoid breathing dust/fume/gas/mist/vapours/spray Wash the handling area thoroughly after work. Handle only outdoors or in a well-ventilated area.</p>
7.2 Conditions for safe storage, including any incompatibilities	
Requirements for storage rooms and vessels	<p>Completely drain empty drums and seal them properly before placing them. Store containers tightly sealed in a well-ventilated area.</p>
7.3 Specific end use(s)	
Specific end use(s)	Laboratory chemicals.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION	
8.1 Control parameters	
KOSHA exposure limits	No data available
ACGIH exposure limits	No data available
Biological Exposure Indices (BEIs)	No data available
8.2 Exposure controls	
	<p>If driving generates dust, fumes, or mist, ensure adequate ventilation to keep air pollution levels below exposure limits. Install facilities for wash and shower to use the material.</p>
8.3 Personal protective equipment	
Respiratory protection	No information available.
EDTA	<p>Wear respiratory protective equipment certified by the Korea Occupational Safety and Health Agency that matches the physical and chemical properties of the particulate matter to which you are exposed. For particulate matter, the following respiratory protection is recommended: Filtering facepiece respirators or air-purifying respirators (with high-efficiency particulate filters) or powered air-purifying respirators (with filters for dust, mist, and fumes). If oxygen levels are insufficient (<19.6%), wear supplied-air respirators or self-contained breathing apparatus (SCBA).</p>
TRIS	<p>Wear respiratory protective equipment certified by the Korea Occupational Safety and Health Agency that matches the physical and chemical properties of the particulate matter to which you are exposed. For particulate matter, the following respiratory protection is recommended: Filtering facepiece respirators or air-purifying respirators (with high-efficiency particulate filters) or powered air-purifying respirators (with filters for dust, mist, and fumes). If oxygen levels are insufficient (<19.6%), wear supplied-air respirators or self-contained breathing apparatus (SCBA).</p>
Suitable eye protection	<p>Wear protective goggles that are breathable to safeguard your eyes against particulate matter that may cause eye irritation or other health hazards. Install emergency washing facilities (shower-type) and eye wash stations in easily accessible locations for workers.</p>
Hand protection	Wear suitable protective gloves, considering physical and chemical properties of chemical substances.
Skin and body protection	Wear suitable protective clothing, considering physical and chemical properties of chemical substances.
9. PHYSICAL AND CHEMICAL PROPERTIES	
9.1 Information on basic physical and chemical properties	
Physical state	liquid
Color	colorless

MATERIAL SAFETY DATA SHEET

Product Name	Buffer P1
Odor	No data available
Odour Threshold	No data available
pH	No data available
Melting point/freezing point	No data available
Boiling point/boiling range	No data available
Flash point	No data available
Evaporation rate	No data available
Flammability (soild, gas)	No data available
Upper/lower flammability or explosive limits	No data available
Vapour pressure	No data available
Solubility (ies)	No data available
Vapour density	No data available
Specific gravity	No data available
Partial coefficient n-octanol/water	No data available
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Viscosity	No data available
Molecular weight	No data available
EDTA	
Physical state	solid
Color	white
Odor	No data available
Odour Threshold	No data available
pH	5.3 (solution)
Melting point/freezing point	255 °C
Boiling point/boiling range	Not applicable
Flash point	No data available
Evaporation rate	No data available
Flammability (soild, gas)	No data available
Upper/lower flammability or explosive limits	No data available
Vapour pressure	Not applicable
Solubility (ies)	1000000 mg/l (estimated)
Vapour density	Not applicable
Specific gravity	No data available
Partial coefficient n-octanol/water	-10.70 (estimated)
Auto-ignition temperature	No data available
Decomposition temperature	252 °C
Viscosity	No data available
Molecular weight	372.14
TRIS	
Physical state	solid
Color	white
Odor	slightly unique odor
Odour Threshold	No data available
pH	10.4 (0.1 molar solution)
Melting point/freezing point	171 ~ 172 °C
Boiling point/boiling range	219 ~ 220 °C (at 10mmHg)
Flash point	170 °C
Evaporation rate	No data available

MATERIAL SAFETY DATA SHEET

Product Name	Buffer P1
Flammability (solid, gas)	flammability
Upper/lower flammability or explosive limits	-/-
Vapour pressure	0.000002 mmHg (@ 25 °C, estimated)
Solubility (ies)	550000 mg/l (@ 25 °C)
Vapour density	4.18
Specific gravity	1.32 (@ 20.4 °C)
Partial coefficient n-octanol/water	-1.56 (estimated)
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Viscosity	No data available
Molecular weight	121.14

9.2 Other information

No data available

10. STABILITY AND REACTIVITY

10.1 Chemical stability and possibility of hazardous reactions

If heated, containers may explode.
Some may combust but does not ignite easily.
Non- flammable : this material does not burn but may evolve corrosive/toxic fumes when heated.

10.2 Conditions to avoid

Ignition sources such as heat, sparks, and flames

10.3 Materials to avoid

Flammable substances and reducing agents

10.4 Hazardous decomposition products

Highly toxic gases can be generated by pyrolysis or combustion during burning.
Corrosive/toxic fumes.

11. TOXICOLOGICAL INFORMATION

11.1 Routes of exposure

EDTA Irritation, nausea, vomiting, diarrhea.
TRIS No data available.

11.2 Information on toxicological effects

Acute toxicity

Oral

EDTA LD50 5900 mg/kg Rabbit
TRIS No data available.

Dermal

EDTA No data available.
TRIS No data available.

Inhalation

EDTA No data available.
TRIS No data available.

Skin corrosion/irritation

EDTA Slight irritation
TRIS Causes skin irritation.

Serious eye damage/eye irritation

EDTA Causes eye irritation.
TRIS Causes eye irritation.

Respiratory sensitisation

MATERIAL SAFETY DATA SHEET

Product Name	Buffer P1
<u>Skin sensitisation</u>	No data available.
<u>Carcinogenicity</u>	No data available.
<u>Genotoxicity</u>	No data available.
<u>Reproductive toxicity</u>	No data available.
<u>Specific target organ toxicity - single exposure</u>	No data available.
EDTA	No data available.
TRIS	Irritates the respiratory tract upon inhalation.
<u>Specific target organ toxicity - repeated exposure</u>	No data available.
<u>Other harmful effects</u>	No data available.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to Fish

EDTA	No data available.
TRIS	LC50 955.892 mg/l 96 hr

Toxicity to Crustacean

EDTA	No data available.
TRIS	EC50 19.793 mg/l 48 hr

Toxicity to Algae

EDTA	No data available.
TRIS	EC50 163.053 mg/l 96 hr

12.2 Persistence and degradability

Persistence

EDTA	log Kow -10.70 (estimated)
TRIS	log Kow -1.56 (estimated)

Degradability

No data available

12.3 Bioaccumulative potential

Bioaccumulation

EDTA	BCF 3.16 (estimated)
TRIS	BCF 3

Biodegradability

EDTA	Non-biodegradable - high potential for bioaccumulation due to lack of decomposition
TRIS	No data available

12.4 Mobility in soil

No data available

12.5 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Dispose of in accordance with all applicable environmental laws and regulations.

13.2 Disposal considerations

Dispose of in accordance with all applicable environmental laws and regulations.

14. TRANSPORT INFORMATION

14.1 UN number

This product is NOT categorized under UN number

MATERIAL SAFETY DATA SHEET

Product Name	Buffer P1
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14.2 UN Proper shipping name	Not applicable
14.3 Transport hazard class(es)	Not applicable
14.4 Packing group	Not applicable
14.5 Environmental hazards	Not applicable
14.6 Special precautions for user	Not applicable
14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not applicable for product as supplied.

15. REGULATORY INFORMATION

15.1 Industrial Safety and Health Act	No data available
15.2 Toxic Chemicals Control Act	No data available
15.3 Safety Control of Dangerous Substances Act	No data available
15.4 Wastes Control Act	Designated waste
15.5 Other requirements in domestic and other countries	Not applicable

16. OTHER INFORMATION

Issued date

2016-02-12

Revision number

2

Revision date

2023-05-11

Reference

EPISUITE

HSNO CCID

HSDB

ECHA

National Library of Medicine/Hazardous Substances Data Bank(NLM/HSDB)(<http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>)The Chemical Database, The Department of Chemistry at the University of Akron(<http://ull.chemistry.uakron.edu/erd>)

ChemIDplus

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

Ecological Structure Activity Relationships(ECOSAR)

Akron University

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

- END OF SAFETY DATA SHEET-

MATERIAL SAFETY DATA SHEET

Product Name

Buffer P2

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Product name Buffer P2

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

Use of the substance or mixture Laboratory chemicals

1.3 Details of the supplier of the safety data sheet

Name GENEALL BIOTECHNOLOGY CO., LTD
 Address GeneAll Bldg., 303-7, Dongnam-ro, Songpa-gu, Seoul, 05729, Korea
 Information contact <+82-2-407-0096
 E-Mail (competent person) sales@geneall.com
 Emergency Telephone Number <+82-2-407-0096

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 [CLP/GHS]

Metal corrosive substances Category 1
 Acute oral toxicity Category 4
 Acute transdermal toxicity Category 4

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 [CLP/GHS]

Hazard pictograms



Signal word

Warning

Hazardous statements

H290 May be corrosive to metal.
 H302 Harmful if swallowed.
 H312 Harmful if contacted.

Precautionary statements

Prevention

P234 Store only in original container.
 P264 Wash skin/hands thoroughly after handling.
 P270 Do not eat, drink or smoke when using this product.
 P280 Wear protective gloves/clothing/eye protection/face protection.

Response

P301+P312 IF SWALLOWED: Consult with doctor if you feel unwell.
 P302+P352 IF ON SKIN: Wash with plenty of soap and water.
 P312 – Consult with doctor if you feel unwell.
 P330 – Rinse mouth.
 P362+P364 Take off contaminated clothing and wash before reuse.
 P390 Absorb spillage to prevent material damage.

Storage

P406 Store in a corrosion-resistant container.

Disposal

P501 Dispose containers in accordance with all applicable environmental laws and regulations.

2.3 Other Non-GHS Classification

No data available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance name	CAS No.	Concentration (%)
Sodium Docecyl Sulfate	151-21-3	0.1~1

4. FIRST AID MEASURES

4.1 Description of first aid measures

General informations

Notify doctor/physician about the substance to take necessary actions.

MATERIAL SAFETY DATA SHEET

Product Name	Buffer P2
Following eye contact	Get an immediate medical treatment. Upon contact with the substance, immediately wash the skin and eyes with running water for at least 20 minutes. Rinse cautiously with water for minutes. Remove contact lenses, if possible. Keep washing.
Following skin contact	If the substance is hot, immerse or rinse the affected area in a large amount of cold water to remove the heat. Get an immediate medical treatment. Take off all contaminated clothing and shoes and isolate the areas. Upon contact with the substance, immediately wash the skin and eyes with running water for at least 20 minutes. Prevent the spread of contamination in case of minor skin contact. If you experience discomfort, seek medical attention from a healthcare provider. Remove or take off all contaminated clothing. Take off contaminated clothing and wash before reuse.
Following inhalation	Move to an area with fresh air. Do not perform resuscitation; use appropriate respiratory medical equipment instead. Keep warm and comfortable. Get an immediate medical treatment.
Following ingestion	Do not perform resuscitation; use appropriate respiratory medical equipment instead. If swallowed, seek medical attention immediately. Consult with doctor, if you feel unwell. Rinse the mouth Do not induce vomiting.

5. FIRE FIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media alcohol foam / carbon dioxide / water spray
dry sand or soil

5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting During burning, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
If heated, containers may explode.
Some may burn but do not ignite easily.
Some may generate flammable hydrogen gas on contact with metals.
It's not flammability, but if heated, it may decompose to cause corrosive/toxic fumes.
Some are oxidizing agents and may ignite combustible materials.
Toxicity: Can cause serious injury or death if inhaled, ingested, or contacted with skin.
Contact with molten material can cause severe burns to skin and eyes.
Can produce irritant, corrosive, and toxic gases in case of fire.
May corrode metals.

5.3 Precautions for fire-fighters

Special protective equipment for firefighters Rescuers must wear appropriate protective equipment.
Extinguish the fire from the distance for safety.
Dig a ditch for the disposal of the fire fighting water and keep the material from dispersing.
Move containers from fire area if it's not dangerous.
In case of tank fire:
Extinguish it from the maximum distance or use fire extinguishing equipment.
Do not allow water to enter into the container.
Cool the container with plenty of water even after the fire is extinguished.
If there's a high-pitched sound or the tank changes color, leave immediately.
Keep away from the tank covered in flames.
In the case of large-scale fire, use unmanned firefighting equipment and if that's not possible, retreat and let it burn.

5.4 Further information

No information available.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

MATERIAL SAFETY DATA SHEET

Product Name	Buffer P2
Personal precautions	Wipe up spills immediately and follow section 8. Eliminate all ignition sources. Prevent leak if it's not dangerous. Do not touch broken containers or spills without appropriate protective clothing. Do not allow water to enter into the container. Cover with plastic sheet to prevent spread. Be aware of substances and conditions to avoid.
6.2 Environmental precautions Environmental precautions	Spillage is corrosive/toxic and may cause contamination. Prevent entry into waterways, drains, basements and confined spaces.
6.3 Methods and material for containment and cleaning up Method for cleaning up	Absorb spill with inert material (e.g. dry sand or earth) and place in chemical waste container. Absorb liquid and flush contaminated area with detergent and water. Absorb spillage to prevent material damage.
7. HANDLING AND STORAGE	
7.1 Precautions for safe handling Advice on safe handling	Use only in well-ventilated areas. Follow all MSDS/label precautions. Use with caution and pay attention to handling and storage. Carefully open the cap. Avoid long-term or continuous skin contact. Do not breathe vapors from heated material. Do not inhale vapors generated from heated substances. Do not enter the storage area without proper ventilation. Be aware of substances and conditions to avoid. Work with reference to section 8. Be careful of high temperatures. Wash thoroughly after handling. Do not eat, drink or smoke when using this product.
7.2 Conditions for safe storage, including any incompatibilities Requirements for storage rooms and vessels	Completely drain empty drums, seal them properly, and return them to the drum controller or place them appropriately. Keep away from food and beverages. Be aware of substances and conditions to avoid. Store only in the original container. Store in a locked storage area. Since it is a corrosive material, store in corrosion-resistant containers.
7.3 Specific end use(s) Specific end use(s)	Laboratory chemicals.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION	
8.1 Control parameters	
KOSHA exposure limits Sodium Docecyl Sulfate	No data available
ACGIH exposure limits Sodium Docecyl Sulfate	STEL C 2 mg/m ³ ETC No data available
Biological Exposure Indices (BEIs)	No data available
8.2 Exposure controls	
Implement process isolation, use local exhaust ventilation, or apply other engineering controls to maintain air levels below exposure limits. Install facilities for wash and shower to use the material.	
8.3 Personal protective equipment	
Respiratory protection	

MATERIAL SAFETY DATA SHEET

Product Name	Buffer P2
Sodium Docecyl Sulfate	<p>Wear respiratory protective equipment certified by the Korea Occupational Safety and Health Agency that matches the physical and chemical properties of the particulate matter to which you are exposed. For particulate matter, the following respiratory protection is recommended:</p> <p>Filtering facepiece respirators or air-purifying respirators (with high-efficiency particulate filters) or powered air-purifying respirators (with filters for dust, mist, and fumes). If oxygen levels are insufficient (<19.6%), wear supplied-air respirators or self-contained breathing apparatus (SCBA).</p>
Suitable eye protection	<p>Wear breathable safety glasses to protect your eyes from particulate matter that may cause eye irritation or other health hazards. Install emergency washing facilities in a location that is easily accessible to workers.</p>
Hand protection	Wear suitable gloves, considering physical/chemical properties of substance.
Skin and body protection	Wear suitable clothes, considering physical/chemical properties of substance.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Physical state	liquid
Color	colorless
Odor	No data available
Odour Threshold	No data available
pH	No data available
Melting point/freezing point	No data available
Boiling point/boiling range	No data available
Flash point	No data available
Evaporation rate	No data available
Flammability (soild, gas)	No data available
Upper/lower flammability or explosive limits	No data available
Vapour pressure	No data available
Solubility (ies)	No data available
Vapour density	No data available
Specific gravity	No data available
Partial coefficient n-octanol/water	No data available
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Viscosity	No data available
Molecular weight	No data available
Physical state	solid
Color	white
Odor	Odorless
Odour Threshold	No data available
pH	(0.05% solution 12; 0.5% solution 13; 5% solution 14 (2))
Melting point/freezing point	318 °C
Boiling point/boiling range	1390 °C
Flash point	Not applicable
Evaporation rate	No data available
Flammability (soild, gas)	Non-flammable (1)
Upper/lower flammability or explosive limits	- / -
Vapour pressure	< 0.001 kPa

MATERIAL SAFETY DATA SHEET

Product Name	Buffer P2
Solubility (ies)	109 g/100mℓ (20°C)
Vapour density	No data available
Specific gravity	2.1
Partial coefficient n-octanol/water	-3.88 (Estimate)
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Viscosity	No data available
Molecular weight	40
Sodium Docecyl Sulfate	
Physical state	solid
Color	white
Odor	slight odor
Odour Threshold	No data available
pH	Not applicable
Melting point/freezing point	204 ~ 207 °C
Boiling point/boiling range	Not applicable
Flash point	No data available
Evaporation rate	No data available
Flammability (soild, gas)	No data available
Upper/lower flammability or explosive limits	- / -
Vapour pressure	0.0000000000047 mmHg (at 25 °C(estimated))
Solubility (ies)	(10%)
Vapour density	Not applicable
Specific gravity	(>1.1 (water=1))
Partial coefficient n-octanol/water	1.6
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Viscosity	No data available
Molecular weight	288.38

9.2 Other information

No data available

10. STABILITY AND REACTIVITY

10.1 Chemical stability and possibility of hazardous reactions

Sodium Docecyl Sulfate Containers may explode when heated.
Some may burn but do not ignite easily.
Non-flammable, the material itself does not burn, but may decompose when heated, generating corrosive/toxic fumes.
In case of fire, irritating, corrosive and toxic gases may be generated.

10.2 Conditions to avoid

Sodium Docecyl Sulfate ignition sources such as heat, sparks, and flames

10.3 Materials to avoid

Sodium Docecyl Sulfate combustible substances, reducible substances

10.4 Hazardous decomposition products

Sodium Docecyl Sulfate irritating, corrosive and toxic gas

11. TOXICOLOGICAL INFORMATION

11.1 Routes of exposure

MATERIAL SAFETY DATA SHEET

Product Name	Buffer P2
Sodium Docecyl Sulfate	Irritation, vomiting; skin irritation, skin disorders, eye irritation.

11.2 Information on toxicological effects

Acute toxicity

Oral

Sodium Docecyl Sulfate LD50 1200 mg/kg Rat

Dermal

Sodium Docecyl Sulfate LD50 600 mg/kg Rabbit

Inhalation

No data available.

Skin corrosion/irritation

Sodium Docecyl Sulfate 250 mg / 24 hr skin - human slight irritation

Serious eye damage/eye irritation

Sodium Docecyl Sulfate 10 mg / 24 hr eyes - rabbit moderate irritation

Respiratory sensitisation

No data available.

Skin sensitisation

Sodium Docecyl Sulfate No data available.

Carcinogenicity

No data available.

Genotoxicity

Sodium Docecyl Sulfate
Reverse mutation test: negative
Sister chromatid exchange test: negative
Micronucleus test: negative

Reproductive toxicity

Sodium Docecyl Sulfate
NOAEL 300 mg/kg/day (maternal toxicity)
NOAEL = 400 mg/kg/day (resorption/litter loss)
NOAEL =600 mg/kg/day

Specific target organ toxicity - single exposure

Sodium Docecyl Sulfate No data available.

Specific target organ toxicity - repeated exposure

Sodium Docecyl Sulfate NOAEL 100 mg/kg/day, liver toxicity

Other harmful effects

No data available.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to Fish

Sodium Docecyl Sulfate LC50 1.31 mg/l 96 hr Cyprinus carpio

Toxicity to Crustacean

Sodium Docecyl Sulfate EC50 6 mg/l 48 hr Daphnia magna

Toxicity to Algae

Sodium Docecyl Sulfate EC50 1.2 mg/l 96 hr Skeletonema costatum

12.2 Persistence and degradability

Persistence

Sodium Docecyl Sulfate log Kow 1.60

Degradability

No data available

12.3 Bioaccumulative potential

Bioaccumulation

Sodium Docecyl Sulfate BCF 2.1 - 7.1

Biodegradability

Sodium Docecyl Sulfate 100 (%) 28 day

MATERIAL SAFETY DATA SHEET

Product Name	Buffer P2
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12.4 Mobility in soil No data available

12.5 Other adverse effects No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Sodium Docecyl Sulfate pre-treat using oil-water separation methods, if available.

13.2 Disposal considerations

Dispose of in accordance with all applicable environmental laws and regulations.

14. TRANSPORT INFORMATION

14.1 UN number

Sodium Docecyl Sulfate Not classified as dangerous good

14.2 UN Proper shipping name

Sodium Docecyl Sulfate Not applicable

14.3 Transport hazard class(es)

Sodium Docecyl Sulfate Not applicable

14.4 Packing group

Sodium Docecyl Sulfate Not applicable

14.5 Environmental hazards

Sodium Docecyl Sulfate No data available

14.6 Special precautions for user

Sodium Docecyl Sulfate Not applicable

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

15. REGULATORY INFORMATION

15.1 Industrial Safety and Health Act

Sodium Docecyl Sulfate No data available

15.2 Toxic Chemicals Control Act

Sodium Docecyl Sulfate No data available

15.3 Safety Control of Dangerous Substances Act

No data available

15.4 Wastes Control Act

Designated waste

15.5 Other requirements in domestic and other countries

In accordance with international laws and regulations of country.

16. OTHER INFORMATION

Issued date

2016-02-12

Revision number

2

Revision date

2023-05-22

Reference

MATERIAL SAFETY DATA SHEET

Product Name	Buffer P2
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ICSC
SIDS
NCIS
ECHA
NLM
SRC
ECOTOX
OECD SIDS
IUCLID
EPISUITE
HSNO CCID

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

- END OF SAFETY DATA SHEET-

MATERIAL SAFETY DATA SHEET

Product Name

Buffer G3

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Product name Buffer G3

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

Use of the substance or mixture Laboratory chemicals

1.3 Details of the supplier of the safety data sheet

Name GENEALL BIOTECHNOLOGY CO., LTD
 Address GeneAll Bldg., 303-7, Dongnam-ro, Songpa-gu, Seoul, 05729, Korea
 Information contact <+82-2-407-0096
 E-Mail (competent person) sales@geneall.com
 Emergency Telephone Number <+82-2-407-0096

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 [CLP/GHS]

Acute oral toxicity Category 4
 Skin corrosion/irritation Category 1
 Serious eye damage/eye irritation Category 1
 Specific Target Organ toxicity (single exposure) Category 3 (Respiratory Irritation)

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 [CLP/GHS]

Hazard pictograms



Signal word Danger

Hazardous statements
 H302: Harmful if swallowed.
 H314: Causes severe skin burns and eye damage.
 H318: Causes serious eye damage.
 H335: May cause respiratory irritation.

Precautionary statements

Prevention
 P280: Wear protective gloves/protective clothing/eye protection/face protection.
 P261: Avoid breathing dust/fume/gas/mist/vapors/spray.
 P271: Use only outdoors or in a well-ventilated area.

Response
 P301+P330+P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
 P303+P361+P353: IF ON SKIN (or hair): Remove immediately all contaminated clothing. Rinse skin with water/shower.
 P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
 P304+P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.

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

Disposal
 P501 Dispose containers in accordance with all applicable environmental laws and regulations.

2.3 Other Non-GHS Classification

No data available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance name	CAS No.	Concentration (%)
Guanidinium chloride	50-01-1	25-45
Acetic acid	64-19-7	1-15

MATERIAL SAFETY DATA SHEET

Product Name	Buffer G3
4. FIRST AID MEASURES	
4.1 Description of first aid measures	
General informations	Symptoms may be delayed after contact or inhalation. Notify doctor/physician about the substance to take necessary actions.
Following eye contact	Rinse cautiously with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing and seek immediate medical attention.
Following skin contact	Immediately remove contaminated clothing. Rinse skin with water/shower. Seek medical attention if irritation or burns develop.
Following inhalation	Move to fresh air. Keep at rest in a position comfortable for breathing. Seek medical attention if symptoms persist.
Following ingestion	Rinse mouth. Do NOT induce vomiting. Seek immediate medical attention.
5. FIRE FIGHTING MEASURES	
5.1 Extinguishing media	
Suitable extinguishing media	Use water spray, alcohol-resistant foam, dry chemical, or carbon dioxide.
5.2 Special hazards arising from the substance or mixture	
Specific hazards during firefighting	Releases toxic fumes under fire conditions (carbon oxides, nitrogen oxides).
5.3 Precautions for fire-fighters	
	Wear self-contained breathing apparatus and full protective gear. In case of tank fire: Extinguish it away from maximum distance or use unmanned fire extinguisher. Keep cooling the container with a large amount of water even after the fire is out. If there's a high pitched noise or change of color, keep away immediately. Keep away from the tank covered in flames. Use unmanned fire extinguishing equipment, and if it's unavailable, just let it burn.
5.4 Further information	
No data available	
6. ACCIDENTAL RELEASE MEASURES	
6.1 Personal precautions, protective equipment and emergency procedures	
Personal precautions	Extremely fine particles can cause fire or explosion, so remove all ignition sources. Clean up spills immediately and follow the preventive measures in the SDS for protective equipment. Avoid contact with leaks. Remove all ignition sources. Ground all equipment when handling the material. If it's not dangerous, stop the leak. Avoid contact without proper protective apparatus. Foam suppressants can be used to reduce vapor. Wear a full-face vapor protective suit in case of a leak without fire. Cover with plastic sheet to prevent spread. Avoid formation of dust. Be aware of the substances and conditions to avoid. Do not breathing dust/fume/gas/mist/vapours/spray. Cover with plastic sheet to prevent spread. Note the substances and conditions to avoid. Avoid breathing dust/fume/gas/mist/vapours/spray
6.2 Environmental precautions	
Environmental precautions	Leaks may cause contamination. Avoid spread into waterway, sewers, drains, or confined areas. Do not release to the environment.

MATERIAL SAFETY DATA SHEET

Product Name

Buffer G3

6.3 Methods and material for containment and cleaning up

Method for cleaning up

Build a dike to collect the water for firefighting.
 Soak up with inert absorbent material(e.g. dry sand or soil), and place into the containers for chemical waste.
 Absorb the liquid and wash off the contaminated area with detergent and water.
 Absorb spillage to prevent material damage.
 Use clean, explosion-proof tools to collect the absorbed material.
 Use a clean shovel to place the spilled material into a clean, dry container. Loosely close the container and move it away from the spill area.
 (large leaks) Make a ditch keeping distance from the leaks.
 (powder leaks) Cover with plastic sheet to prevent spread and keep dry.
 (small leaks) Absorb it with sand or an inert material and place it into a container.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Advice on safe handling

Do not apply pressure, cut, weld, solder, bond, drill, grind, expose to heat, flames, sparks, static electricity, or ignition sources.
 Empty containers may retain product residue and can be hazardous.
 Follow all MSDS/label precaution.
 Use with caution and pay attention to handling and storage.
 Carefully open the cap.
 Avoid prolonged or continuous skin contact.
 Ground all equipment when handling the material.
 Be aware of the substances and conditions to avoid.
 See section 8 for exposure controls and protective equipment.
 Be cautious of high temperatures.
 There is a risk of oxygen deficiency at low-lying or confined workplaces.
 Therefore, measure the oxygen concentration in the air and ensure proper ventilation during the work.
 Use explosion-proof electrical, ventilating, lighting, and equipment.
 Only use tools that do not generate spark.
 Take precautionary measures against static discharge.
 Avoid breathing dust/fume/gas/mist/vapours/spray
 Wash the handling area thoroughly after work.
 Handle only outdoors or in a well-ventilated area.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage rooms and vessels

Completely drain empty drums and seal them properly before placing them.
 Be aware of the substances and conditions to avoid.
 Keep away from heat, sparks, open flames, and hot surfaces. - No smoking
 Keep only in the original container.
 Store containers tightly sealed in a cool and well-ventilated area.
 Since it is a corrosive to metals, store in a corrosion-resistant container.

7.3 Specific end use(s)

Specific end use(s)

Laboratory chemicals.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

ACGIH exposure limits

Acetic Acid

10 ppm TWA; 15 ppm STEL

Biological Exposure Indices (BEIs)

Guanidinium chloride

No data available

8.2 Exposure controls

Use appropriate engineering controls such as process enclosure, local exhaust ventilation, or maintaining airborne concentrations below recommended exposure limits.
 If driving generates dust, fumes, or mist, ensure adequate ventilation to keep air pollution levels below exposure limits.
 Install facilities for wash and shower to use the material.

8.3 Personal protective equipment

MATERIAL SAFETY DATA SHEET

Product Name	Buffer G3
Respiratory protection	Eye/Face Protection: Safety goggles with side-shields Skin Protection: Protective gloves and clothing Respiratory Protection: Use NIOSH-approved respirator if exposure limits are exceeded

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Guanidinium chloride

Physical state	liquid
Color	Colorlessness
Odor	Odorless
Odour Threshold	No data available
pH	4.3
Melting point/freezing point	No data available
Boiling point/boiling range	No data available
Flash point	No data available
Evaporation rate	No data available
Flammability (soild, gas)	No data available
Upper/lower flammability or explosive limits	No data available
Vapour pressure	0.00000176 mmHg (25°C (estimated))
Solubility (ies)	215 g/100mℓ (20°C)
Vapour density	No data available
Specific gravity	1.3
Partial coefficient n-octanol/water	-1.7
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Viscosity	No data available
Molecular weight	95.5

Acetic acid

Physical state	liquid
Color	colorless
Odor	No data available
Odour Threshold	No data available
pH	2.4 (1.0M solution)
Melting point/freezing point	No data available
Boiling point/boiling range	No data available
Flash point	No data available
Evaporation rate	No data available
Flammability (soild, gas)	No data available
Upper/lower flammability or explosive limits	17 / 6 %
Vapour pressure	20.79 hPa (25°C)
Solubility (ies)	302.9 g/ℓ (25°C)
Vapour density	No data available
Specific gravity	1.05 (25°C)
Partial coefficient n-octanol/water	-0.17
Auto-ignition temperature	485 °C
Decomposition temperature	No data available
Viscosity	1.056 cP (25°C)
Molecular weight	60.0516

9.2 Other information

No data available

MATERIAL SAFETY DATA SHEET

Product Name

Buffer G3

10. STABILITY AND REACTIVITY

10.1 Chemical stability and possibility of hazardous reactions

If heated, containers may explode.
Some may combust but does not ignite easily.
It's not flammability, but if heated, it may decompose to cause corrosive/toxic fumes.
It may release irritating, corrosive, or toxic gases in the event of a fire.

10.2 Conditions to avoid

Ignition sources such as heat, sparks, and flames

10.3 Materials to avoid

Flammable materials, reducing agents

10.4 Hazardous decomposition products

Highly toxic gases such as ammonia and nitrogen oxides can be generated by pyrolysis or combustion during burning
Corrosive/toxic fume
Irritative/toxic gas

11. TOXICOLOGICAL INFORMATION

11.1 Routes of exposure

May cause irritation, nausea, vomiting, loss of voice, difficulty breathing, headache, lung damage, diarrhea, hyperactivity, sleep disturbances, convulsions, and pupil dilation.

11.2 Information on toxicological effects

Acute toxicity

Oral

Guanidinium chloride LD50 475 mg/kg Rat
Acetic acid L050 3310 mg/kg Rat

Dermal

Guanidinium chloride LD50 > 2000 mg/kg Rabbit
Acetic acid LD50 1060 mg/kg Rabbit

Inhalation

Guanidinium chloride LC50 5.319 mg/l 4 hr Rat
Acetic acid LC50 16000 ppm 4 hr Rat

Skin corrosion/irritation

Guanidinium chloride As a result of a test on rabbits, severe irritation was observed.
Acetic acid Necrosis and burns of the skin have been seen in animal experiments

Serious eye damage/eye irritation

Guanidinium chloride As a result of a test on rabbits, moderate irritation was observed.
Acetic acid Causes serious eye damage in rabbits, permanent corneal damage, accidental corneal damage in humans

Respiratory sensitisation

No data available

Skin sensitisation

Guanidinium chloride The sensitization test using guinea pigs yielded a negative result.

Carcinogenicity

No data available

Genotoxicity

Guanidinium chloride The results of the microbial reverse mutation test : Negative
The results of the chromosome aberration test : Negative

Reproductive toxicity

Guanidinium chloride No data available

MATERIAL SAFETY DATA SHEET

Product Name	Buffer G3
<u>Specific target organ toxicity - single exposure</u>	
Guanidinium chloride	Cause respiratory irritation.
<u>Specific target organ toxicity - repeated exposure</u>	
Guanidinium chloride	No data available
<u>Other harmful effects</u>	
	No data available
12. ECOLOGICAL INFORMATION	
12.1 Toxicity	
<u>Toxicity to Fish</u>	
Guanidinium chloride	LC50 1758 mg/l 48 hr
Acetic acid	LC50 251 mg/l 96 hr
<u>Toxicity to Crustacean</u>	
	No data available
<u>Toxicity to Algae</u>	
	No data available
12.2 Persistence and degradability	
<u>Persistence</u>	
	No data available
<u>Degradability</u>	
Guanidinium chloride	No data available
Acetic acid	74%
12.3 Bioaccumulative potential	
<u>Bioaccumulation</u>	
	No data available
<u>Biodegradability</u>	
Guanidinium chloride	(activated Sludge, domestic Sewage)
12.4 Mobility in soil	
	No data available
12.5 Other adverse effects	
	No data available
13. DISPOSAL CONSIDERATIONS	
13.1 Waste treatment methods	
	Perform pre-treatment using an oil-water separation method, if available.
13.2 Disposal considerations	
	Dispose of in accordance with all applicable environmental laws and regulations.
14. TRANSPORT INFORMATION	
14.1 UN number	
	This product is NOT categorized under UN number
14.2 UN Proper shipping name	
	Not applicable
14.3 Transport hazard class(es)	
	Not applicable
14.4 Packing group	
	Not applicable
14.5 Environmental hazards	
	No data available
14.6 Special precautions for user	
	Emergency measures in case of fire

MATERIAL SAFETY DATA SHEET

Product Name	Buffer G3
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Emergency measures in case of spill
Not applicable

Not applicable

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

15. REGULATORY INFORMATION

15.1 Industrial Safety and Health Act

No data available

15.2 Toxic Chemicals Control Act

No data available

15.3 Safety Control of Dangerous Substances Act

No data available

15.4 Wastes Control Act

No data available

15.5 Other requirements in domestic and other countries

No data available

16. OTHER INFORMATION

Issued date

2021-02-12

Revision number

1

Revision date

2023-05-23

Reference

Corporate Solution From Thomson Micromedex(<http://csi.micromedex.com>)
 ECB-ESIS(European chemical Substances Information System)(<http://ecb.jrc.it/esis>)
 ECOTOX Database, EPA(<http://cfpub.epa.gov/ecotox>)
 IUCLID Chemical Data Sheet, EC-ECB
 International Chemical Safety Cards(ICSC)(<http://www.nihs.go.jp/ICSC>)
 TOXNET, U.S. National Library of Medicine(<http://toxnet.nlm.nih.gov>)
 The Chemical Database, The Department of Chemistry at the University of Akron(<http://ull.chemistry.uakron.edu/erd>)
 ICSC
 ECHA
 PATTY
 ACGIH

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

- END OF SAFETY DATA SHEET-

MATERIAL SAFETY DATA SHEET

Product Name

Buffer EW1

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Product name Buffer EW1

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

Use of the substance or mixture Laboratory chemicals

1.3 Details of the supplier of the safety data sheet

Name GENEALL BIOTECHNOLOGY CO., LTD
 Address GeneAll Bldg., 303-7, Dongnam-ro, Songpa-gu, Seoul, 05729, Korea
 Information contact <+82-2-407-0096
 E-Mail (competent person) sales@geneall.com
 Emergency Telephone Number <+82-2-407-0096

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 [CLP/GHS]

Acute oral toxicity Category 4
 Skin Irritation Category 2
 Eye Irritation Category 2A

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 [CLP/GHS]

Hazard pictograms



Signal word Warning

Hazardous statements
 H302 Harmful if swallowed.
 H315: Causes skin irritation.
 H319: Causes serious eye irritation.

Precautionary statements

Prevention P280: Wear protective gloves/protective clothing/eye protection/face protection.

Response
 301+P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
 P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Storage Store in a tightly closed container in a cool, dry, well-ventilated area away from incompatible substances.

Disposal P501 Dispose containers in accordance with all applicable environmental laws and regulations.

2.3 Other Non-GHS Classification

No data available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance name	CAS No.	Concentration (%)
Guanidinium chloride	50-01-1	25-50

4. FIRST AID MEASURES

4.1 Description of first aid measures

General informations Symptoms may be delayed after contact or inhalation.
 Notify doctor/physician about the substance to take necessary actions.

Following eye contact Rinse thoroughly with water for at least 15 minutes. Seek medical attention if irritation persists.

MATERIAL SAFETY DATA SHEET

Product Name	Buffer EW1
Following skin contact	Wash with soap and water. Remove contaminated clothing. Get medical attention if irritation develops.
Following inhalation	Move to fresh air. Seek medical attention if symptoms persist.
Following ingestion	Rinse mouth. Do NOT induce vomiting. Seek immediate medical attention.

5. FIRE FIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting

The reaction can undergo vigorous polymerization, which may lead to fire and explosion.
The vapor can be transferred to an ignition source and may ignite.
Highly irritative and toxic gases can be generated by pyrolysis or combustion during burning.
It can form explosive mixtures at or above the flash point.
If heated, containers may explode.
Flammability: Easily ignited by heat, sparks, or flames.
Spills may cause a fire/explosion.
There is a risk of vapor explosion indoors, outdoors, and in sewers.
Some may combust but does not ignite easily.
Vapors can form explosive mixtures with air.
Vapors can travel to an ignition source and flash back.
It's not flammability, but if heated, it may decompose to cause corrosive/toxic fumes.
May be toxic, if inhaled or absorbed through the skin.
Flammable liquid and vapor

Contact may cause severe burn on eyes and skin.
Vapors may cause dizziness or asphyxiation without awareness.
It may be toxic if inhaled or ingested.
Flammable liquid and vapor.
May cause corrosion of metals.

5.3 Precautions for fire-fighters

Guanidinium chloride

Wear appropriate protective apparatus.
Extinguish the fire from a safe distance away from the area.
Be aware that it may be transported in a melted form or at high temperature.
Dig a ditch for the disposal of the fire fighting water and keep the material from dispersing.
Move the containers from fire, if not dangerous.

In case of tank fire:
Extinguish it away from maximum distance or use unmanned fire extinguisher.
Keep cooling the container with a large amount of water even after the fire is out.
If there's a high pitched noise or change of color, keep away immediately.
Keep away from the tank covered in flames.
Use unmanned fire extinguishing equipment, and if it's unavailable, just let it burn.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions

Extremely fine particles can cause fire or explosion, so remove all ignition sources.
Clean up spills immediately and follow the preventive measures in the SDS for protective equipment.
Avoid contact with leaks.
Remove all ignition sources.
Ground all equipment when handling the material.
If it's not dangerous, stop the leak.
Avoid contact without proper protective apparatus.
Foam suppressants can be used to reduce vapor.
Wear a full-face vapor protective suit in case of a leak without fire.
Cover with plastic sheet to prevent spread.
Avoid formation of dust.
Be aware of the substances and conditions to avoid.
Do not breathing dust/fume/gas/mist/vapours/spray.
Cover with plastic sheet to prevent spread.
Note the substances and conditions to avoid.
Avoid breathing dust/fume/gas/mist/vapours/spray

6.2 Environmental precautions

Environmental precautions

Leaks may cause contamination.
Avoid spread into waterway, sewers, drains, or confined areas.
Do not release to the environment.

6.3 Methods and material for containment and cleaning up

MATERIAL SAFETY DATA SHEET

Product Name	Buffer EW1
Method for cleaning up	Absorb with inert material and place in chemical waste container. Wash spill site after material pickup.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Advice on safe handling

Prevention

Use with adequate ventilation.

Avoid contact with skin, eyes, and clothing.

Do not eat, drink, or smoke when using this product.

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

Response

In case of skin contact: Wash with soap and water.

In case of eye contact: P305+P351+P338: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

If inhaled: Move to fresh air and seek medical attention if symptoms persist.

If ingested: P301+P312: Rinse mouth and call a POISON CENTER or doctor/physician if you feel unwell.

Storage

Store in a tightly closed container in a cool, dry, well-ventilated area away from incompatible substances.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage rooms and vessels

Completely drain empty drums and seal them properly before placing them.

Be aware of the substances and conditions to avoid.

Keep away from heat, sparks, open flames, and hot surfaces. - No smoking

Store containers tightly sealed in a cool and well-ventilated area.

7.3 Specific end use(s)

Specific end use(s)

Laboratory chemicals.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

KOSHA exposure limits

Guanidinium chloride

No data available

ACGIH exposure limits

Guanidinium chloride

No data available

Biological Exposure Indices (BEIs)

Guanidinium chloride

No data available

8.2 Exposure controls

Use appropriate engineering controls such as process enclosure, local exhaust ventilation, or maintaining airborne concentrations below recommended exposure limits.

Install facilities for wash and shower to use the material.

8.3 Personal protective equipment

Respiratory protection

Wear respiratory protection, according to the physical and chemical properties of the exposed material which has been tested and approved under appropriate government standard.

If the exposure concentration is:

(below 2,000 ppm) wear a half-face respirator equipped with an appropriate filter or canister.

(below 5,000 ppm) wear a loose-fitting powered air-purifying respirator (PAPR) equipped with an appropriate filter or canister, or a continuous-flow particulate respirator/chemical cartridge respirator (particulate respirators are only applicable for liquid aerosols).

(below 10,000 ppm) wear a full-face or powered half-face respirator, or an air-supplied continuous-flow/pressure-demand half-face respirator equipped with an appropriate filter or canister.

(below 200,000 ppm) wear a full-face or helmet/hood-type, pressure-demand supplied-air respirator.

(below 2,000,000 ppm) wear a self-contained breathing apparatus (SCBA) or a pressure-demand self-contained breathing apparatus (SCBA) equipped with an appropriate filter or canister.

Suitable eye protection

Wear protective goggles that are breathable to safeguard your eyes against particulate matter that may cause eye irritation or other health hazards.

Install emergency washing facilities (shower-type) and eye wash stations in easily accessible locations for workers.

Wear the following types of eye protection against eye irritation or other health hazards:

(For gaseous organic substances) wear sealed goggles.

(For vaporous organic substances) wear goggles or ventilated goggles.

(For particulate substances) wear ventilated goggles.

Hand protection

Wear suitable protective gloves, considering physical and chemical properties of chemical substances.

Skin and body protection

Wear suitable protective clothing, considering physical and chemical properties of chemical substances.

MATERIAL SAFETY DATA SHEET

Product Name

Buffer EW1

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Physical state	liquid
Color	colorless
Odor	No data available
Odour Threshold	No data available
pH	6.2 (10% solution)
Melting point/freezing point	178 ~ 185 °C
Boiling point/boiling range	>82°C
Flash point	No data available
Evaporation rate	No data available
Flammability (solid, gas)	No data available
Upper/lower flammability or explosive limits	No data available
Vapour pressure	0.00000176 mmHg (25 °C (estimated))
Solubility (ies)	Soluble in water
Vapour density	No data available
Specific gravity	1.3
Partial coefficient n-octanol/water	-1.7
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Viscosity	No data available
Molecular weight	95.5

9.2 Other information

No data available

10. STABILITY AND REACTIVITY

10.1 Chemical stability and possibility of hazardous reactions

If heated, containers may explode.
Some may combust but does not ignite easily.
It's not flammability, but if heated, it may decompose to cause corrosive/toxic fumes.
It may release irritating, corrosive, or toxic gases in the event of a fire.

10.2 Conditions to avoid

Ignition sources such as heat, sparks, and flames

10.3 Materials to avoid

Flammable materials, reducing agents

10.4 Hazardous decomposition products

Highly toxic gases can be generated by pyrolysis or combustion during burning.
Corrosive/toxic fume
Irritative/toxic gas

11. TOXICOLOGICAL INFORMATION

11.1 Routes of exposure

May cause irritation, nausea, vomiting, loss of voice, difficulty breathing, headache, lung damage, diarrhea, hyperactivity, sleep disturbances, convulsions, and pupil dilation.

11.2 Information on toxicological effects

Acute toxicity

Oral

LD50 475 mg/kg Rat

MATERIAL SAFETY DATA SHEET

Product Name	Buffer EW1
Dermal	LD50 > 2000 mg/kg Rabbit
Inhalation	LC50 5.319 mg/l 4 hr Rat
<u>Skin corrosion/irritation</u>	As a result of a test on rabbits, severe irritation was observed.
<u>Serious eye damage/eye irritation</u>	As a result of a test on rabbits, moderate irritation was observed.
<u>Respiratory sensitisation</u>	No data available
<u>Skin sensitisation</u>	The sensitization test using guinea pigs yielded a negative result.
<u>Carcinogenicity</u>	
IARC	No data available
OSHA	No data available
ACGIH	No data available
NTP	No data available
EU CLP	No data available
<u>Genotoxicity</u>	The results of the microbial reverse mutation test : Negative
	The results of the chromosome aberration test : Negative
<u>Reproductive toxicity</u>	No data available
<u>Specific target organ toxicity - single exposure</u>	Cause respiratory irritation.
<u>Specific target organ toxicity - repeated exposure</u>	No data available
<u>Inhalation Toxicity</u>	No data available
<u>Other harmful effects</u>	No data available

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Ecotoxicity: Harmful to aquatic life with long-lasting effects.

12.2 Persistence and degradability

Persistence

Guanidinium chloride No data available

Degradability

Guanidinium chloride No data available

12.3 Bioaccumulative potential

Bioaccumulation

MATERIAL SAFETY DATA SHEET

Product Name	Buffer EW1
	No data available
<u>Biodegradability</u>	(activated Sludge, domestic Sewage)
12.4 Mobility in soil	No data available
12.5 Other adverse effects	No data available
13. DISPOSAL CONSIDERATIONS	
13.1 Waste treatment methods	Perform pre-treatment using an oil-water separation method, if available. Incinerate at high temperature or treat by high-temperature melting.
13.2 Disposal considerations	Dispose of in accordance with all applicable environmental laws and regulations.
14. TRANSPORT INFORMATION	
14.1 UN number	This product is NOT categorized under UN number
14.2 UN Proper shipping name	Not applicable
14.3 Transport hazard class(es)	Not applicable
14.4 Packing group	Not applicable
14.5 Environmental hazards	No data available
14.6 Special precautions for user	
Emergency measures in case of fire	Not applicable
Emergency measures in case of spill	Not applicable
14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not applicable for product as supplied.
15. REGULATORY INFORMATION	
15.1 Industrial Safety and Health Act	
Guanidinium chloride	No data available
15.2 Toxic Chemicals Control Act	
Guanidinium chloride	No data available
15.3 Safety Control of Dangerous Substances Act	
Guanidinium chloride	No data available
15.4 Wastes Control Act	
Guanidinium chloride	No data available
15.5 Other requirements in domestic and other countries	
Guanidinium chloride	No data available
16. OTHER INFORMATION	
Issued date	2021-02-12
Revision number	1
Revision date	2023-05-23
Reference	

MATERIAL SAFETY DATA SHEET

Product Name

Buffer EW1

Corporate Solution From Thomson Micromedex(<http://csi.micromedex.com>)
ECB-ESIS(European chemical Substances Information System)(<http://ecb.jrc.it/esis>)
ECOTOX Database, EPA(<http://cfpub.epa.gov/ecotox>)
IUCLID Chemical Data Sheet, EC-ECB
International Chemical Safety Cards(ICSC)(<http://www.nihs.go.jp/ICSC>)
TOXNET, U.S. National Library of Medicine(<http://toxnet.nlm.nih.gov>)
The Chemical Database, The Department of Chemistry at the University of Akron(<http://ull.chemistry.uakron.edu/erd>)
ICSC
ECHA
PATTY
ACGIH

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

- END OF SAFETY DATA SHEET-

MATERIAL SAFETY DATA SHEET

Product Name

Buffer EW2

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Product name Buffer EW2

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

Use of the substance or mixture Laboratory chemicals

1.3 Details of the supplier of the safety data sheet

Name GENEALL BIOTECHNOLOGY CO., LTD
 Address GeneAll Bldg., 303-7, Dongnam-ro, Songpa-gu, Seoul, 05729, Korea
 Information contact <+82-2-407-0096
 E-Mail (competent person) sales@geneall.com
 Emergency Telephone Number <+82-2-407-0096

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 [CLP/GHS]

This product is NOT classified as regulated substance and NOT subject to label elements.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 [CLP/GHS]

Hazard pictograms No data available
 Signal word No data available
 Hazardous statements No data available
 Precautionary statements
 Prevention No data available
 Response No data available
 Storage No data available
 Disposal No data available

2.3 Other Non-GHS Classification

No data available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance name	CAS No.	Concentration (%)
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No hazardous substance

4. FIRST AID MEASURES

4.1 Description of first aid measures

General informations Notify doctor/physician about the substance to take necessary actions.
 Following eye contact No data available
 Following skin contact No data available
 Following inhalation Try artificial respiration, if not breathe.
 Provide oxygen, if breathing is difficult.
 Following ingestion Do not give any food to an unconscious person.

5. FIRE FIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media No data available

5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting If heated, containers may explode.

5.3 Precautions for fire-fighters

MATERIAL SAFETY DATA SHEET

Product Name	Buffer EW2
Special protective equipment for firefighters	In case of tank fire: Keep cooling the container with a large amount of water even after the fire is out. If there's a high pitched noise or change of color, keep away immediately. Keep away from the tank covered in flames. Heated or exploded containers may release water that can cause burns to the skin and eyes.

5.4 Further information

No information available.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions Be aware of the substances and conditions to avoid.

6.2 Environmental precautions

Environmental precautions No data available

6.3 Methods and material for containment and cleaning up

Method for cleaning up No data available

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Advice on safe handling Be aware of the substances and conditions to avoid.
See section 8 for exposure controls and protective equipment.
Be cautious of high temperatures.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage rooms and vessels Be aware of the substances and conditions to avoid.

7.3 Specific end use(s)

Specific end use(s) Laboratory chemicals.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

KOSHA exposure limits No data available

ACGIH exposure limits No data available

Biological Exposure Indices (BEIs) No data available

8.2 Exposure controls

No data available

8.3 Personal protective equipment

Respiratory protection Wear respiratory protection, according to the physical and chemical properties of the exposed material which has been tested and approved under appropriate government standard.
Proper protective apparatus for respiration such like Face filter dust mask, air filter dust mask, electric fan attached dust mask is recommended.
If oxygen levels are insufficient (<19.6%), wear supplied-air respirators or self-contained breathing apparatus (SCBA).

Suitable eye protection Wear protective goggles that are breathable to safeguard your eyes against particulate matter that may cause eye irritation or other health hazards.

Hand protection Wear suitable protective gloves, considering physical and chemical properties of chemical substances.

Skin and body protection Wear suitable protective clothing, considering physical and chemical properties of chemical substances.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Physical state liquid

Color colorless

MATERIAL SAFETY DATA SHEET

Product Name	Buffer EW2
Odor	No odor
Odour Threshold	Not applicable
pH	7-8
Melting point/freezing point	No data available
Boiling point/boiling range	No data available
Flash point	Not applicable
Evaporation rate	No data available
Flammability (solid, gas)	Not applicable
Upper/lower flammability or explosive limits	-/-
Vapour pressure	No data available
Solubility (ies)	No data available
Vapour density	No data available
Specific gravity	No data available
Partial coefficient n-octanol/water	No data available
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Viscosity	No data available
Molecular weight	No data available

9.2 Other information

No data available

10. STABILITY AND REACTIVITY

10.1 Chemical stability and possibility of hazardous reactions

Stable under ambient temperature and pressure conditions.
If heated, containers may explode.

10.2 Conditions to avoid

heat, contamination

10.3 Materials to avoid

water-reactive substance

10.4 Hazardous decomposition products

No data available

11. TOXICOLOGICAL INFORMATION

11.1 Routes of exposure

No data available

11.2 Information on toxicological effects

Acute toxicity

Oral

No data available.

Dermal

No data available.

Inhalation

No data available.

Skin corrosion/irritation

Not applicable

Serious eye damage/eye irritation

Not applicable

Respiratory sensitisation

Not applicable

MATERIAL SAFETY DATA SHEET

Product Name	Buffer EW2
<u>Skin sensitisation</u>	Not applicable
<u>Carcinogenicity</u>	No data available.
<u>Genotoxicity</u>	Not applicable
<u>Reproductive toxicity</u>	Not applicable
<u>Specific target organ toxicity - single exposure</u>	Not applicable
<u>Specific target organ toxicity - repeated exposure</u>	Not applicable
<u>Other harmful effects</u>	No data available.
12. ECOLOGICAL INFORMATION	
12.1 Toxicity	
<u>Toxicity to Fish</u>	No data available.
<u>Toxicity to Crustacean</u>	No data available.
<u>Toxicity to Algae</u>	No data available.
12.2 Persistence and degradability	
<u>Persistence</u>	No data available.
<u>Degradability</u>	No data available
12.3 Bioaccumulative potential	
<u>Bioaccumulation</u>	No data available
<u>Biodegradability</u>	No data available
12.4 Mobility in soil	No data available
12.5 Other adverse effects	No data available
13. DISPOSAL CONSIDERATIONS	
13.1 Waste treatment methods	
Dispose of in accordance with all applicable environmental laws and regulations.	
13.2 Disposal considerations	
Dispose of in accordance with all applicable environmental laws and regulations.	
14. TRANSPORT INFORMATION	
14.1 UN number	This product is NOT categorized under UN number
14.2 UN Proper shipping name	Not applicable
14.3 Transport hazard class(es)	Not applicable
14.4 Packing group	Not applicable
14.5 Environmental hazards	No data available
14.6 Special precautions for user	

MATERIAL SAFETY DATA SHEET

Product Name

Buffer EW2

Not applicable

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

15. REGULATORY INFORMATION**15.1 Industrial Safety and Health Act**

Not applicable

15.2 Toxic Chemicals Control Act

Not applicable

15.3 Safety Control of Dangerous Substances Act

Not applicable

15.4 Wastes Control Act

Not applicable

15.5 Other requirements in domestic and other countries

Not applicable

16. OTHER INFORMATION**Issued date**

2016-10-31

Revision number

1

Revision date

2023-08-27

Reference

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

- END OF SAFETY DATA SHEET -

MATERIAL SAFETY DATA SHEET

Product Name

Buffer EF

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Product name Buffer EF

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

Use of the substance or mixture Laboratory chemicals

1.3 Details of the supplier of the safety data sheet

Name GENEALL BIOTECHNOLOGY CO., LTD
 Address GeneAll Bldg., 303-7, Dongnam-ro, Songpa-gu, Seoul, 05729, Korea
 Information contact <+82-2-407-0096
 E-Mail (competent person) sales@geneall.com
 Emergency Telephone Number <+82-2-407-0096

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 [CLP/GHS]

Skin corrosion/irritation Category 2
 Serious eye damage/eye irritation Category 2
 Specific Target Organ toxicity (single exposure) Category 3 (respiratory irritation)

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 [CLP/GHS]

Hazard pictograms



Signal word Warning

Hazardous statements
 H315 Causes skin irritation.
 H319 Causes serious eye irritation.
 H335 May cause respiratory irritation.

Precautionary statements

Prevention
 P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
 P264 Wash skin/hands thoroughly after handling.
 P271 Handle it only outdoors or in a well-ventilated area.
 P280 Wear protective gloves/clothing/eye protection/face protection.

Response
 P302+P352 IF ON SKIN: Wash with plenty of soap and water.
 P304+P340 IF INHALED: Move patients into fresh air and help them to get rest.
 P305+P351+P338 IF IN EYES: Rinse with water attentively for several minutes.
 P312 Consult with doctor if you feel unwell.
 P332+P313 If skin irritation 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.

Storage
 P403 + P233 Keep container tightly closed and store in a well-ventilated place.
 P405 Store it being locked up.

Disposal
 P501 Dispose containers in accordance with all applicable environmental laws and regulations.

2.3 Other Non-GHS Classification

No data available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance name	CAS No.	Concentration (%)
TRIS	77-86-1	0.001~0.01

4. FIRST AID MEASURES

MATERIAL SAFETY DATA SHEET

Product Name	Buffer EF
4.1 Description of first aid measures	
General informations	Notify doctor/physician about the substance to take necessary actions.
Following eye contact	Immediately flush the eyes with water for minutes. Remove contact lense, if possible. Keep washing.
Following skin contact	If the material is hot, immerse or wash the affected area with a large amount of cold water to remove the heat. Get emergency medical attention. Remove contaminated clothing and footwear and isolate contaminated areas. In case of contact with substance, flush the skin immediately with water for at least 20 minutes. In case of minor skin contact, prevent the spread of contamination. If skin irritation occurs, take medical advice or attention. Remove contaminated clothing and wash before reusing.
Following inhalation	If exposed to excessive dust or fumes, remove them with clean air. Seek medical attention, if you experience coughing or other symptoms. If breathing has stopped, perform artificial respiration. If breathing is difficult, provide oxygen.
Following ingestion	Get medical advice/attention.
5. FIRE FIGHTING MEASURES	
5.1 Extinguishing media	
Suitable extinguishing media	Use alcohol foam, carbon dioxide, or water spray. Use dry sand or soil for smothering fires.
5.2 Special hazards arising from the substance or mixture	
Specific hazards during firefighting	Highly toxic gases can be generated by pyrolysis or combustion during burning. If heated, containers may explode. Some may combust but does not ignite easily. It's not flammability, but if heated, it may decompose to cause corrosive/toxic fumes.
5.3 Precautions for fire-fighters	
Special protective equipment for firefighters	Wear appropriate protective apparatus. Extinguish the fire from a safe distance away from the area. Be aware that it may be transported in a melted form. Dig a ditch for the disposal of the fire fighting water and keep the material from dispersing. Move the containers from fire, if not dangerous. In case of tank fire: Extinguish it away from maximum distance or use unmanned fire extinguisher. Keep cooling the container with a large amount of water even after the fire is out. If there's a high pitched noise or change of color, keep away immediately. Keep away from the tank covered in flames. Use unmanned fire extinguishing equipment, and if it's unavailable, just let it burn.
5.4 Further information	
No information available.	
6. ACCIDENTAL RELEASE MEASURES	
6.1 Personal precautions, protective equipment and emergency procedures	
Personal precautions	Clean spills and see section 5.3. Remove all ignition sources. If it's not dangerous, stop the leak. Cover with plastic sheet to prevent spread. Note the substances and conditions to avoid. Avoid breathing dust/fume/gas/mist/vapours/spray
6.2 Environmental precautions	
Environmental precautions	Avoid spread into waterway, sewers, drains, or confined areas.
6.3 Methods and material for containment and cleaning up	

MATERIAL SAFETY DATA SHEET

Product Name	Buffer EF
Method for cleaning up	Soak up with inert absorbent material(e.g. dry sand or soil), and place into the containers for chemical waste. Absorb the liquid and wash off the contaminated area with detergent and water.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Advice on safe handling	<p>Empty containers may retain product residue. Follow all MSDS/label precautions. Carefully open the cap. Avoid prolonged or continuous skin contact. Be aware of the substances and conditions to avoid. See section 8 for exposure controls and protective equipment. Avoid breathing dust/fume/gas/mist/vapours/spray Wash the handling area thoroughly after work. Handle only outdoors or in a well-ventilated area.</p>
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7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage rooms and vessels	<p>Completely drain empty drums and seal them properly before placing them. Store containers tightly sealed in a well-ventilated area.</p>
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7.3 Specific end use(s)

Specific end use(s)	Laboratory chemicals.
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8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

KOSHA exposure limits	No data available
ACGIH exposure limits	No data available
Biological Exposure Indices (BEIs)	No data available

8.2 Exposure controls

If driving generates dust, fumes, or mist, ensure adequate ventilation to keep air pollution levels below exposure limits.
Install facilities for wash and shower to use the material.

8.3 Personal protective equipment

Respiratory protection	<p>Wear respiratory protective equipment certified by the Korea Occupational Safety and Health Agency that matches the physical and chemical properties of the particulate matter to which you are exposed. For particulate matter, the following respiratory protection is recommended: Filtering facepiece respirators or air-purifying respirators (with high-efficiency particulate filters) or powered air-purifying respirators (with filters for dust, mist, and fumes). If oxygen levels are insufficient (<19.6%), wear supplied-air respirators or self-contained breathing apparatus (SCBA).</p>
Suitable eye protection	<p>Wear protective goggles that are breathable to safeguard your eyes against particulate matter that may cause eye irritation or other health hazards. Install emergency washing facilities (shower-type) and eye wash stations in easily accessible locations for workers.</p>
Hand protection	Wear suitable protective gloves, considering physical and chemical properties of chemical substances.
Skin and body protection	Wear suitable protective clothing, considering physical and chemical properties of chemical substances.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Physical state	liquid
Color	colorless
Odor	Slight distinctive odor
Odour Threshold	No data available
pH	10.4 (0.1 molar solution)

MATERIAL SAFETY DATA SHEET

Product Name	Buffer EF
Melting point/freezing point	171 ~ 172°C
Boiling point/boiling range	219 ~ 220°C (at 10mmHg)
Flash point	170 °C
Evaporation rate	No data available
Flammability (soild, gas)	flammability
Upper/lower flammability or explosive limits	-/-
Vapour pressure	0.000002 mmHg (@ 25 °C, estimated)
Solubility (ies)	550000 mg/l (@ 25 °C)
Vapour density	4.18
Specific gravity	1.32 (@ 20.4 °C)
Partial coefficient n-octanol/water	-1.56 (estimated)
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Viscosity	No data available
Molecular weight	121.14

9.2 Other information

No data available

10. STABILITY AND REACTIVITY

10.1 Chemical stability and possibility of hazardous reactions

If heated, containers may explode.

Some may combust but does not ignite easily.

Non-flammable : this material does not burn but may evolve corrosive/toxic fumes when heated.

Can produce irritant, corrosive, and toxic gases in case of fire.

10.2 Conditions to avoid

Ignition sources such as heat, sparks, and flames

10.3 Materials to avoid

Flammable substances and reducing agents

10.4 Hazardous decomposition products

Highly toxic gases can be generated by pyrolysis or combustion during burning.

Corrosive/toxic fumes.

11. TOXICOLOGICAL INFORMATION

11.1 Routes of exposure

No data available.

11.2 Information on toxicological effects

Acute toxicity

Oral

LD50 5900 mg/kg Rabbit

Dermal

No data available.

Inhalation

No data available.

Skin corrosion/irritation

Causes skin irritation.

Serious eye damage/eye irritation

Causes eye irritation.

Respiratory sensitisation

No data available.

MATERIAL SAFETY DATA SHEET

Product Name	Buffer EF
<u>Skin sensitisation</u>	No data available.
<u>Carcinogenicity</u>	No data available.
<u>Genotoxicity</u>	No data available.
<u>Reproductive toxicity</u>	No data available.
<u>Specific target organ toxicity - single exposure</u>	Irritates the respiratory tract upon inhalation.
<u>Specific target organ toxicity - repeated exposure</u>	No data available.
<u>Other harmful effects</u>	No data available.
12. ECOLOGICAL INFORMATION	
12.1 Toxicity	
<u>Toxicity to Fish</u>	LC50 955.892 mg/l 96 hr
<u>Toxicity to Crustacean</u>	EC50 19.793 mg/l 48 hr
<u>Toxicity to Algae</u>	EC50 163.053 mg/l 96 hr
12.2 Persistence and degradability	
<u>Persistence</u>	log Kow -1.56 (estimated)
<u>Degradability</u>	No data available
12.3 Bioaccumulative potential	
<u>Bioaccumulation</u>	BCF 3
<u>Biodegradability</u>	No data available
12.4 Mobility in soil	No data available
12.5 Other adverse effects	No data available
13. DISPOSAL CONSIDERATIONS	
13.1 Waste treatment methods	
Dispose of in accordance with all applicable environmental laws and regulations.	
13.2 Disposal considerations	
Dispose of in accordance with all applicable environmental laws and regulations.	
14. TRANSPORT INFORMATION	
14.1 UN number	
This product is NOT categorized under UN number	
14.2 UN Proper shipping name	
Not applicable	
14.3 Transport hazard class(es)	
Not applicable	
14.4 Packing group	
Not applicable	
14.5 Environmental hazards	
Not applicable	

MATERIAL SAFETY DATA SHEET

Product Name

Buffer EF

14.6 Special precautions for user

Not applicable

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

15. REGULATORY INFORMATION

15.1 Industrial Safety and Health Act

Not applicable

15.2 Toxic Chemicals Control Act

Not applicable

15.3 Safety Control of Dangerous Substances Act

Not applicable

15.4 Wastes Control Act

Not applicable

15.5 Other requirements in domestic and other countries

Not applicable

16. OTHER INFORMATION

Issued date

2016-02-12

Revision number

2

Revision date

2023-05-23

Reference

HSDB

ECHA

National Library of Medicine/Hazardous Substances Data Bank(NLM/HSDB)(<http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>)The Chemical Database, The Department of Chemistry at the University of Akron(<http://ull.chemistry.uakron.edu/erd>)

ChemIDplus

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

Ecological Structure Activity Relationships(ECOSAR)

Akron University

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

- END OF SAFETY DATA SHEET-

MATERIAL SAFETY DATA SHEET

Product Name

RNase A

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Product name RNase A solution

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

Use of the substance or mixture Laboratory chemicals

1.3 Details of the supplier of the safety data sheet

Name GENEALL BIOTECHNOLOGY CO., LTD
 Address GeneAll Bldg., 303-7, Dongnam-ro, Songpa-gu, Seoul, 05729, Korea
 Information contact <+82-2-407-0096
 E-Mail (competent person) sales@geneall.com
 Emergency Telephone Number <+82-2-407-0096

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 [CLP/GHS]

This product is NOT classified as regulated substance and NOT subject to label elements.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 [CLP/GHS]

Hazard pictograms No data available
 Signal word No data available
 Hazardous statements No data available
 Precautionary statements
 Prevention No data available
 Response No data available
 Storage No data available
 Disposal No data available

2.3 Other Non-GHS Classification

No data available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance name	CAS No.	Concentration (%)
RIBONUCLEASE A TYPE I	9001-99-4	2-10

4. FIRST AID MEASURES

4.1 Description of first aid measures

General informations Notify doctor/physician about the substance to take necessary actions.
 Following eye contact In case of contact with substance, flush the eyes immediately with water for at least 20 minutes. Immediately seek medical advice/attention.
 Following skin contact In case of contact with substance, flush the skin immediately with water for at least 20 minutes. Remove contaminated clothing and footwear and isolate contaminated areas. Take off contaminated clothing and wash before reuse. Get an immediate medical treatment.
 Following inhalation Get an immediate medical treatment. Move to an area with fresh air. Try artificial respiration, if not breathe. Provide oxygen, if it is hard to breathe.
 Following ingestion Do not give any food to an unconscious person. Get an immediate medical treatment.

5. FIRE FIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media Small fire: dry sand, dry chemical, alcohol-resistant foam, water spray, regular foam, carbon dioxide (suitable extinguishing media)
 Large fire: Use water spray/mist, general foam (suitable extinguishing media)

MATERIAL SAFETY DATA SHEET

Product Name	RNase A
5.2 Special hazards arising from the substance or mixture	
Specific hazards during firefighting	<p>Can be ignited by heat, sparks, or flames. If heated, containers may explode. Some may combust but does not ignite easily. Can produce irritant and toxic gases in case of fire. Inhalation of the substance may be harmful. Some liquids may produce vapors that can cause dizziness or asphyxiation.</p>
5.3 Precautions for fire-fighters	
Special protective equipment for firefighters	<p>Move containers from fire area if it's not dangerous. Some may be transported at high temperatures. Spills may cause contamination. Contact may cause burns to skin and eyes. Dig a ditch for the disposal of the fire fighting water and keep the material from dispersing. In case of tank fire: Cool the container with plenty of water even after the fire is extinguished. If there's a high-pitched sound or the tank changes color, leave immediately. Keep away from the tank covered in flames.</p>
5.4 Further information	
No information available.	
6. ACCIDENTAL RELEASE MEASURES	
6.1 Personal precautions, protective equipment and emergency procedures	
Personal precautions	<p>Remove all ignition sources. Stop the leak, if it's not dangerous. Be aware of the substances and conditions to avoid. Ventilate the contaminated area. Do not touch the exposed material. Prevent dust formation.</p>
6.2 Environmental precautions	
Environmental precautions	Avoid spread into waterway, sewers, drains, or confined areas.
6.3 Methods and material for containment and cleaning up	
Method for cleaning up	<p>(small leaks) Wash the contaminated area with plenty of water. (small leaks) Absorb it with sand or an inert material and place it into a container. (large leaks) Make a ditch keeping distance from the leaks. Use a clean shovel to place the spilled material into a clean, dry container. Loosely close the container and move it away from the spill area. Cover with plastic sheet to prevent spread and keep dry.</p>
7. HANDLING AND STORAGE	
7.1 Precautions for safe handling	
Advice on safe handling	<p>Be aware of the substances and conditions to avoid. Wash thoroughly after handling. Work with reference to section 8. Be cautious of high temperatures.</p>
7.2 Conditions for safe storage, including any incompatibilities	
Requirements for storage rooms and vessels	<p>Keep container tightly closed. Store in a cool, dry place. Be aware of the substances and conditions to avoid.</p>
7.3 Specific end use(s)	
Specific end use(s)	Laboratory chemicals.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION	
8.1 Control parameters	
KOSHA exposure limits	No data available
ACGIH exposure limits	No data available
Biological Exposure Indices (BEIs)	No data available
8.2 Exposure controls	

MATERIAL SAFETY DATA SHEET

Product Name

RNase A

Use appropriate engineering controls and local exhaust ventilation below recommended exposure limits.

8.3 Personal protective equipment

Respiratory protection

Wear respiratory protection, according to the physical and chemical properties of the exposed material which has been tested and approved under appropriate government standard.
Proper protective apparatus for respiration such like Face filter dust mask, air filter dust mask, electric fan attached dust mask is recommended.
If oxygen levels are insufficient (<19.6%), wear supplied-air respirators or self-contained breathing apparatus.

Suitable eye protection

Wear protective goggles that are breathable to safeguard your eyes against particulate matter that may cause eye irritation or other health hazards.

Hand protection

Wear suitable chemical-resistant gloves, considering physical and chemical properties of chemical substances.

Skin and body protection

Wear suitable chemical-resistant clothing, considering physical and chemical properties of chemical substances.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Physical state	liquid
Color	colorless
Odor	No data available
Odour Threshold	No data available
pH	No data available
Melting point/freezing point	No data available
Boiling point/boiling range	No data available
Flash point	No data available
Evaporation rate	No data available
Flammability (solid, gas)	No data available
Upper/lower flammability or explosive limits	-/-
Vapour pressure	No data available
Solubility (ies)	No data available
Vapour density	No data available
Specific gravity	No data available
Partial coefficient n-octanol/water	No data available
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Viscosity	No data available
Molecular weight	No data available

9.2 Other information

No data available

10. STABILITY AND REACTIVITY

10.1 Chemical stability and possibility of hazardous reactions

Stable under ambient temperature and pressure conditions.
If heated, containers may explode.
Some may combust but does not ignite easily.
Can produce irritant and toxic gases in case of fire.
Inhalation of the substance may be harmful.
Some liquids may produce vapors that can cause dizziness or asphyxiation.

10.2 Conditions to avoid

Ignition sources such as heat, sparks, and flames

10.3 Materials to avoid

flammable material, irritant/toxic gas

10.4 Hazardous decomposition products

MATERIAL SAFETY DATA SHEET

Product Name	RNase A
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No data available

11. TOXICOLOGICAL INFORMATION

11.1 Routes of exposure

No data available

11.2 Information on toxicological effects

Acute toxicity

Oral

No data available.

Dermal

No data available.

Inhalation

No data available.

Skin corrosion/irritation

No data available.

Serious eye damage/eye irritation

No data available.

Respiratory sensitisation

No data available.

Skin sensitisation

No data available.

Carcinogenicity

No data available.

Genotoxicity

No data available.

Reproductive toxicity

No data available.

Specific target organ toxicity - single exposure

No data available.

Specific target organ toxicity - repeated exposure

No data available.

Other harmful effects

No data available.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to Fish

No data available.

Toxicity to Crustacean

No data available.

Toxicity to Algae

No data available.

12.2 Persistence and degradability

Persistence

No data available.

Degradability

No data available

12.3 Bioaccumulative potential

Bioaccumulation

No data available

Biodegradability

No data available

12.4 Mobility in soil

No data available

12.5 Other adverse effects

No data available

MATERIAL SAFETY DATA SHEET

Product Name

RNase A

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Dispose of in accordance with all applicable environmental laws and regulations.

13.2 Disposal considerations

Dispose of in accordance with all applicable environmental laws and regulations.

14. TRANSPORT INFORMATION

14.1 UN number

This product is NOT categorized under UN number

14.2 UN Proper shipping name

Not applicable

14.3 Transport hazard class(es)

Not applicable

14.4 Packing group

Not applicable

14.5 Environmental hazards

No data available

14.6 Special precautions for user

For personal protection see section 8.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

15. REGULATORY INFORMATION

15.1 Industrial Safety and Health Act

No data available

15.2 Toxic Chemicals Control Act

No data available

15.3 Safety Control of Dangerous Substances Act

No data available

15.4 Wastes Control Act

Dispose of as hazardous waste in compliance with local and national regulations.

15.5 Other requirements in domestic and other countries

Not applicable

16. OTHER INFORMATION

Issued date

2016-02-12

Revision number

2

Revision date

2023-05-22

Reference

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

- END OF SAFETY DATA SHEET -