Material Safety Data Sheet

Version No.: 5.0 (Revision Date: 2023-06-20)

Elution buffer

1. PRODUCT AND COMPANY IDENTIFICATION

A. Product name : Elution buffer

B. Recommended use : Research use only

C. Supplier

○ Company name : Bioneer corporation

○ Address : 71, Techno 2-ro, Yuseong-gu, Daejeon, Republic of Korea

○ Telephone : +82-42-1588-9788

2. HAZARDS IDENTIFICATION

A. Emergency Overview

Not applicable

B. GHS Label elements, including precautionary statements

○ Pictogram

Not applicable

○ Signal word : Not applicable

○ Hazard statements(s) :

Not applicable

○ Precautionary statements :

Prevention :

Not applicable

Response :

Not applicable

Storage :

Not applicable

Disposal :

Not applicable

C. Other hazards which do not result in classification (Example: dust explosion hazard) : No data available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS Number	Weight per volume percent [% (w/v)]
4-(2-Hydroxyethyl)-piperazine-1-ethanesulfonic acid	7365-45-9	1 ~ 5%
Sodium chloride	7647-14-5	1 ~ 5%
Imidazole	288-32-4	5 ~ 10%
Glycerol	56-81-5	10 ~ 15%

4. FIRST AID MEASURES

A. In case of eye contact :

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do - continue rinsing.

Get immediate medical advice/attention.

B. In case of skin contact :

IF ON SKIN (or hair): Take off Immediately all contaminated clothing. Rinse SKIN with water [or shower].

Get immediate medical advice/attention.

C. If Inhaled :

IF INHALED: Remove person to fresh air and keep comfortable for breathing.

Get immediate medical advice/attention.

D. If swallowed :

IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

Get immediate medical advice/attention.

E. Notes to physician :

Notify medical personnel of contaminated situations and have them take appropriate protective measures.

5. FIRE-FIGHTING MEASURES

A. Suitable (or unsuitable) extinguishing media :

Suitable extinguishing media: Water, Foam, Carbon dioxide (CO_2), Dry powder.

Unsuitable extinguishing media: High-pressure water.

B. Specific hazards arising from the chemical (Example: Hazardous substances generated during combustion) :

Material may produce irritating and highly toxic gases from decomposition by heat and combustion during burning.

Heating may cause an explosion of container.

C. Special protective actions for firefighters :

Rescuers should put on appropriate protective gear.

Evacuate area and fight fire from a safe distance.

Move containers from fire area if you can do it without risk.

6. ACCIDENTAL RELEASE MEASURES

A. Personal precautions, protective equipment :

Avoid breathing dust/fume/gas/mist/vapors/spray.

Clean up spills immediately, observing precautions in '8. EXPOSURE CONTROLS/PERSONAL PROTECTION' section.

Isolate hazard area.

Keep unnecessary and unprotected personnel from entering.

Eliminate all ignition sources.

Stop leak if you can do it without risk.

Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

B. Environmental precautions :

Runoff from fire control may be corrosive and/or toxic and cause pollution.

Prevent entry into water ways, sewers, basements or confined areas.

C. The methods of purification and removal :

Absorb spills with inert material (e.g., dry sand or earth), then place in a chemical waste container.

Reduce dust and prevent scattering by moistening with water.

Dissolve in water and collect for proper disposal.

Absorb the liquid and scrub the area with detergent and water.

7. HANDLING AND STORAGE

A. Precautions for safe handling :

Do not handle until all safety precautions have been read and understood.

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

Use carefully in handling/storage.

Use only outdoors or in a well-ventilated area.

Loosen closure cautiously before opening.

Avoid breathing dust/fume/gas/mist/vapors/spray.

Wash your hands thoroughly after handling.

Avoid prolonged or repeated contact with skin.

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

Follow all MSDS/label precautions even after container is emptied because they may retain product residues.

B. Conditions for safe storage, including any incompatibilities :

Store in a cool, well-ventilated place. Keep container tightly closed.

Do not apply any physical shock to container.

Avoid direct sunlight.

Keep in the original container.

Please pay attention to incompatibilities materials and conditions to avoid.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

A. Occupational Exposure Limits :

Glycerol (56-81-5)	
Republic of Korea - Occupational Exposure Limits	
Local name	Glycerin mist
ISHA OEL TWA	10 mg/m^3
Regulatory reference	MOEL Public Notice. No. 2020-48
USA - OSHA - Occupational Exposure Limits	
Local name	Glycerin (mist)
OSHA PEL TWA [1]	15 mg/m^3 (Total dust) 5 mg/m^3 (Respirable fraction)

Regulatory reference (US-OSHA)	OSHA Annotated Table Z-1

B. Appropriate engineering controls :

Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

If user operations generate dust, fume, or mist, use ventilation to keep exposure to airborne contaminants below the recommended exposure limit.

Facilities for storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

C. Personal Protective Equipment :

○ Respiratory protection :

Uses respirator when vapours/aerosols are generated.

Use a European Standard EN 149 (or other accompanying standards relating to the used respiratory protection system) approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

○ Eye protection :

Wear the protective glasses or breathable safety goggles to protect from vaporous state organic material causing eye irritation or other disorder.

An eye wash unit and safety shower station should be available nearby work place.

○ Hand protection :

Wear appropriate protective gloves by considering physical and chemical properties of chemicals.

○ Skin and body protection :

Wear appropriate resistant protective clothing by considering physical and chemical properties of chemicals.

9. PHYSICAL AND CHEMICAL PROPERTIES

A. Appearance (form, color, etc) : No data available.

B. Odor : No data available.

C. Odor Threshold : No data available.

D. pH : No data available.

E. Melting/Freezing point : No data available.

F. Initial boiling point/range : No data available.

G. Flash point : No data available.

H. Evaporation rate : No data available.

I. Flammability (solid, gas) : No data available.

J. Lower/upper explosion limit : No data available.

K. Vapor pressure : No data available.

L. Water solubility : No data available.

M. Relative vapor density : No data available.

N. Density : No data available.

O. Partition coefficient: n-octanol/water : No data available.

P. Autoignition temperature : No data available.

Q. Decomposition temperature : No data available.

R. Viscosity : No data available.

S. Molecular weight : No data available.

10. STABILITY AND REACTIVITY

A. Chemical stability/Possibility of hazardous reactions :

May decompose at high temperatures into forming toxic gases.

Heating may cause an explosion of container.

B. Conditions to avoid :

Keep away from heat/sparks/open flames/hot surfaces.

C. Incompatible materials :

No data available.

D. Hazardous decomposition products :

No data available.

11. TOXICOLOGICAL INFORMATION

A. Information on the likely routes of exposure

Category	Chemical name	Content
Likely routes of exposure	4-(2-Hydroxyethyl)-piperazine-1-ethanesulfonic acid	No data available.
	Sodium chloride	No data available.
	Imidazole	No data available.
	Glycerol	No data available.

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

Category	Chemical name	Content
Acute toxicity (Oral)	4-(2-Hydroxyethyl)-piperazine-1-ethanesulfonic acid	LD50 oral rat ➔ 2000 mg/kg (OECD Guideline 423), (EU Method B.1 tris)
	Sodium chloride	LD50 oral rat ➔ 3000 mg/kg (ChemIDplus)
	Imidazole	LD50 oral rat ➔ ≈ 970 mg/kg (OECD Guideline 401)
	Glycerol	LD50 oral rat ➔ 27200 mg/kg
Acute toxicity (Dermal)	4-(2-Hydroxyethyl)-piperazine-1-ethanesulfonic acid	LD50 dermal rat ➔ > 2000 mg/kg (OECD Guideline 402), (EU Method B.3)
	Sodium chloride	LD50 dermal rabbit ➔ > 10000 mg/kg
	Imidazole	No data available.
	Glycerol	No data available.
Acute toxicity (Inhalation)	4-(2-Hydroxyethyl)-piperazine-1-	No data available.

	ethanesulfonic acid	
	Sodium chloride	LC50 Inhalation - Rat (Dust/Mist) > 10.5 mg/l Source: Corporate Solution From Thomson Micromedex LC50 Inhalation - Rat (Dust/Mist) ➔ > 10.5 mg/l (Corporate Solution From Thomson Micromedex)
	Imidazole	No data available.
	Glycerol	LC50 Inhalation - Rat ➔ 5.85 mg/l air Animal: rat LC50 Inhalation - Rat (Vapours) ➔ > 2.75 mg/l Source: ECHA
Skin corrosion/irritation	4-(2-Hydroxyethyl)-piperazine-1-ethanesulfonic acid	No data available.
	Sodium chloride	No data available.
	Imidazole	No data available.
	Glycerol	No data available.
Serious eye damage/eye irritation	4-(2-Hydroxyethyl)-piperazine-1-ethanesulfonic acid	No data available.
	Sodium chloride	No data available.
	Imidazole	No data available.
	Glycerol	No data available.
Respiratory or skin sensitization	4-(2-Hydroxyethyl)-piperazine-1-ethanesulfonic acid	No data available.
	Sodium chloride	No data available.
	Imidazole	No data available.
	Glycerol	No data available.
Germ cell mutagenicity	4-(2-Hydroxyethyl)-piperazine-1-	No data available.

	ethanesulfonic acid	
	Sodium chloride	No data available.
	Imidazole	No data available.
	Glycerol	No data available.
Carcinogenicity	4-(2-Hydroxyethyl)-piperazine-1-ethanesulfonic acid	No data available.
	Sodium chloride	No data available.
	Imidazole	No data available.
	Glycerol	No data available.
Reproductive toxicity	4-(2-Hydroxyethyl)-piperazine-1-ethanesulfonic acid	No data available.
	Sodium chloride	No data available.
	Imidazole	No data available.
	Glycerol	No data available.
Specific target organ toxicity - single exposure	4-(2-Hydroxyethyl)-piperazine-1-ethanesulfonic acid	No data available.
	Sodium chloride	No data available.
	Imidazole	No data available.
	Glycerol	No data available.
Specific target organ toxicity - repeated exposure	4-(2-Hydroxyethyl)-piperazine-1-ethanesulfonic acid	No data available.
	Sodium chloride	No data available.
	Imidazole	NOAEL (oral, rat, 90 days) ➔ 60 mg/kg (OECD Guideline 408) May cause damage to organs through prolonged or repeated exposure.
	Glycerol	No data available.

Aspiration harzard	4-(2-Hydroxyethyl)-piperazine-1-ethanesulfonic acid	No data available.
	Sodium chloride	No data available.
	Imidazole	No data available.
	Glycerol	No data available.

C. Numerical measures of toxicity (Example: Acute toxicity estimate)

Category	Chemical name	Content
Numerical measures of toxicity	4-(2-Hydroxyethyl)-piperazine-1-ethanesulfonic acid	No data available.
	Sodium chloride	No data available.
	Imidazole	No data available.
	Glycerol	No data available.
Acute toxicity estimate (Oral)	Elution buffer	2,000 mg/kg over
Acute toxicity estimate (Dermal)	Elution buffer	2,000 mg/kg over
Acute toxicity estimate (Inhalation)	Elution buffer	20 mg/l (Vapours) over [Content of components for which there is no Acute Toxicity (Inhalation) (Vapours) data : Almost 10%] 5 mg/l (Dust/Mist) over [Content of components for which there is no Acute Toxicity (Inhalation) (Dust/Mist) data : Almost 20%]

12. ECOLOGICAL INFORMATION

Category	Chemical name	Content
Ecotoxicity (Fish)	4-(2-Hydroxyethyl)-piperazine-1-ethanesulfonic acid	LC50 - Fish ➔ > 100 mg/l (Danio rerio)
	Sodium chloride	LC50 - Fish ➔ 5840 mg/l (Lepomis macrochirus)
	Imidazole	LC50 - Fish ➔ 327 mg/l (SIDS)
	Glycerol	LC50 - Fish ➔ 54000 mg/l (Oncorhynchus mykiss)
Ecotoxicity (Crustacea)	4-(2-Hydroxyethyl)-piperazine-1-ethanesulfonic acid	EC50 - Crustacea ➔ > 100 mg/l (Daphnia magna)
	Sodium chloride	LOEC (chronic) ➔ 441 mg/l (Daphnia pulex) (Duration: '21 d') NOEC (chronic) ➔ 314 mg/l (Daphnia pulex) (Duration: '21 d')
	Imidazole	EC50 - Crustacea ➔ 341.5 mg/l (Daphnia magna)
	Glycerol	No data available.
Ecotoxicity (Algae)	4-(2-Hydroxyethyl)-piperazine-1-ethanesulfonic acid	EC50 96h - Algae ➔ 3237.037 mg/l (Ecological Structure Activity Relationships) EC50 72h - Algae ➔ > 100 mg/l (Raphidocelis subcapitata)
	Sodium chloride	No data available.
	Imidazole	EC50 72h - Algae ➔ 133 mg/l (Desmodesmus subspicatus)
	Glycerol	No data available.
Persistence and degradability	4-(2-Hydroxyethyl)-piperazine-1-ethanesulfonic acid	No data available.
	Sodium chloride	No data available.
	Imidazole	No data available.
	Glycerol	No data available.
Bioaccumulative potential	4-(2-Hydroxyethyl)-piperazine-1-	Partition coefficient n-octanol/water (Log Pow) = -4.07 (National Library of Medicine)

	ethanesulfonic acid	
	Sodium chloride	No data available.
	Imidazole	Partition coefficient n-octanol/water (Log Pow) = -0.08
	Glycerol	Partition coefficient n-octanol/water (Log Pow) = -1.75 (ECHA)
Mobility in soil	4-(2-Hydroxyethyl)-piperazine-1-ethanesulfonic acid	0.01354 (EPI Suite) Partition coefficient n-octanol/water (Log Pow) = -4.07 (National Library of Medicine)
	Sodium chloride	No data available.
	Imidazole	Partition coefficient n-octanol/water (Log Pow) = -0.08
	Glycerol	Partition coefficient n-octanol/water (Log Pow) = -1.75 (ECHA)
Other adverse effects	4-(2-Hydroxyethyl)-piperazine-1-ethanesulfonic acid	No data available.
	Sodium chloride	No data available.
	Imidazole	No data available.
	Glycerol	No data available.

13. DISPOSAL CONSIDERATIONS

A. Disposal methods :

Waste material must be disposed of in accordance with the national and local regulations.

B. Special precautions for disposal :

The user of this product must disposal by oneself or entrust to waste disposer or person who other's waste recycle and dispose, person who establish and operate waste disposal facilities.

14. TRANSPORT INFORMATION

UN RTDG	ADR	IMDG	IATA
A. UN number			
Not applicable	Not applicable	Not applicable	Not applicable
B. UN proper shipping name			
Not applicable	Not applicable	Not applicable	Not applicable
C. Transport hazard class(es)			
Not applicable	Not applicable	Not applicable	Not applicable
Not applicable	Not applicable	Not applicable	Not applicable
D. Packing group			
Not applicable	Not applicable	Not applicable	Not applicable
E. Marine pollutant			
Not applicable	Not applicable	Not applicable	Not applicable
- No supplementary information available.			

F. Special precautions for user:

in case of fire : Not applicable

in case of leakage : Not applicable

15. REGULATORY INFORMATION

A. Occupational Safety and Health Act

Category	Applicable or Not Applicable	Detail information
Hazardous Substances Prohibited for Manufacturing	Not applicable	-
Hazardous Substances Requiring Permission	Not applicable	-
Threshold Limit Values Chemicals	Applicable	56-81-5: Glycerin mist
Hazardous Substances Below Permissible Level	Not applicable	-
Hazardous Substances Subject to Working Environment Measurement	Not applicable	-
Hazardous Substances Subject to Workers Requiring Health	Not applicable	-

Examination		
Hazardous Substances Subject to Control	Not applicable	-
Substance Subject to Submission of PSM	Not applicable	-

B. Chemicals Control Act

Category	Applicable or Not Applicable	Detail information
Toxic Substances	Not applicable	-
Prohibited Substances	Not applicable	-
Restricted Substances	Not applicable	-
Substances Requiring Preparation for Accident	Not applicable	-

C. ACT ON REGISTRATION, EVALUATION, ETC. OF CHEMICALS (K-REACH)

Category	Applicable or Not Applicable	Detail information
Korea Existing Chemicals Inventory (MOE, Republic of Korea)	Applicable	7647-14-5: Sodium chloride 288-32-4: Imidazole 56-81-5: Glycerol
Priority Existing Chemicals (MOE, Republic of Korea)	Not applicable	-
Substances Subject to Intensive Control	Not applicable	-
CMR Substances	Not applicable	-

D. Safety Control of Dangerous Substances Act

Category	Applicable or Not Applicable	Detail information

Safety Control of Dangerous Substances Act	Applicable	56-81-5: Glycerin (Class 4 Flammable liquid - category 5 Third class Petroleum Water-soluble (Designated quantity: 4,000 liter))

E. Wastes Control Act

Category	Applicable or Not Applicable	Detail information
Hazardous Substances in Designated wastes	Not applicable	-
Types of wastes	No data available	-

F. Other Domestic and International Regulatory Information

- Domestic

Category	Applicable or Not Applicable	Detail information
Persistent Organic Pollutants(POPs) Control Act	Not applicable	-
Ozone Depleting Substances(ODS)	Not applicable	-

- International

- EU Regulatory Information

Category	Applicable or Not Applicable	Detail information
EU Candidate list (SVHC)	Contains no substance(s) listed on the REACH Candidate List	-
EU authorization list (REACH Annex XIV)	Contains no substance(s) listed on	

	REACH Annex XIV (Authorisation List)	
EU restriction list (REACH Annex XVII)	Applicable	-

- US Regulatory Information

Category	Applicable or Not Applicable	Detail information
CERCLA Section 103 (40CFR302.4)	Not applicable	-
EPCRA Section 302 (40CFR355.30)	Not applicable	-
EPCRA Section 304 (40CFR355.40)	Not applicable	-
EPCRA Section 313 (40CFR372.65)	Not applicable	-

- International agreements

No data available

16. OTHER INFORMATION

A. Key literature reference and sources for data

1) Chemical reagent provider's Material Safety Data Sheet. (2. HAZARDS IDENTIFICATION // 4. FIRST AID MEASURES // 5. FIRE-FIGHTING MEASURES // 6. ACCIDENTAL RELEASE MEASURES // 7. HANDLING AND STORAGE // 8. EXPOSURE CONTROLS/PERSONAL PROTECTION // 9. PHYSICAL AND CHEMICAL PROPERTIES // 10. STABILITY AND REACTIVITY // 11. TOXICOLOGICAL INFORMATION // 12. TOXICOLOGICAL INFORMATION)

2) Korea Occupational Safety & Health Agency chemical information, http://msds.kosha.or.kr/MSDSInfo/ (2. HAZARDS IDENTIFICATION // 4. FIRST AID MEASURES // 5. FIRE-FIGHTING MEASURES // 6. ACCIDENTAL RELEASE MEASURES // 7. HANDLING AND STORAGE // 8. EXPOSURE CONTROLS/PERSONAL PROTECTION // 9. PHYSICAL AND CHEMICAL PROPERTIES // 10. STABILITY AND REACTIVITY // 11. TOXICOLOGICAL INFORMATION // 12. TOXICOLOGICAL INFORMATION)

3) ExESS Material Safety Data Sheet program's database search. (8. EXPOSURE CONTROLS/PERSONAL PROTECTION // 11. TOXICOLOGICAL INFORMATION // 12. ECOLOGICAL INFORMATION // 14. TRANSPORT

INFORMATION // 15. REGULATORY INFORMATION)

4. Korea Maritime Dangerous Goods Inspection & Research Institute, http://eng.komdi.or.kr/ (14. TRANSPORT INFORMATION)

B. Issue date : 26-April-2013

C. Revision number and Last date revised : 5 (20-June-2023)

D. Disclaimer :

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. BIONEER corporation shall not be held liable for any damage resulting from handling or from contact with the above product.