

SAFETY DATA SHEET

Republic of Korea

In accordance with the Standard for Classification and Labeling of Chemical Substance and Safety Data Sheet, Article 10 Paragraph 1

Section 1. Chemical product and company identification

A. Product name 1M Citric Acid**Catalogue Number** SH31172.01**Article Number** 29966331**B. Recommended use of the chemical**

For Further Manufacturing or Research Use. Not for Diagnostic or Therapeutic Use.

Restrictions on use**Uses advised against****C. Manufacturer** HyClone Laboratories
925 West 1800 South
Logan, Utah 84321
Phone: (435) 792-8000**Supplier**Cytiva Singapore
1 Maritime Square #13-01
Harbourfront Centre
Singapore 099253Cytiva Austria
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(with hours of operation) (9.00 am - 6.00 pm)

Section 2. Hazards identification

A. Hazard classification EYE IRRITATION - Category 2A
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) -
Category 3

This product is classified in accordance with the Industrial Safety and Health Act and the Chemical Control Act.

B. GHS label elements, including precautionary statements**Symbol****Signal word**

Warning

Hazard statementsCauses serious eye irritation.
May cause respiratory irritation.**Precautionary statements****Prevention**Wear eye or face protection. Use only outdoors or in a well-ventilated area. Avoid breathing vapor.
Wash thoroughly after handling.

Response	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor if you feel unwell. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice or attention.
Storage	Store locked up. Store in a well-ventilated place. Keep container tightly closed.
Disposal	Dispose of contents and container in accordance with all local, regional, national and international regulations.
C. Other hazards which do not result in classification	None known.

Section 3. Composition/information on ingredients

Substance/mixture	Mixture			
Other means of identification	Not available.			
Ingredient name	Common name	Identifiers	%	
CITRIC ACID		CAS: 77-92-9 EC: 201-069-1	≥15 - ≤20	

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

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

Section 4. First aid measures

A. Eye contact	Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
B. Skin contact	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.
C. Inhalation	Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
D. Ingestion	Wash out mouth with water. Remove dentures if any. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
E. Notes to physician	Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
Specific treatments	No specific treatment.
Protection of first-aiders	No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

A. Extinguishing media	
Suitable	Use an extinguishing agent suitable for the surrounding fire.
Not suitable	None known.
B. Specific hazards arising from the chemical	In a fire or if heated, a pressure increase will occur and the container may burst.
Hazardous thermal decomposition products	Decomposition products may include the following materials: carbon dioxide carbon monoxide
C. Special protective equipment for fire-fighters	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.
Special precautions for fire-fighters	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Section 6. Accidental release measures

- A. Personal precautions, protective equipment and emergency procedures** No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- B. Environmental precautions** Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).
- C. Methods and materials for containment and cleaning up**
- Small spill** Stop leak if without risk. Move containers from spill area. Absorb with an inert material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. The spilled material may be neutralized with sodium carbonate, sodium bicarbonate or sodium hydroxide. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations.

Section 7. Handling and storage

- A. Precautions for safe handling**
- Protective measures** Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- Advice on general occupational hygiene** Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- B. Conditions for safe storage, including any incompatibilities** Store between the following temperatures: 15 to 30°C (59 to 86°F). Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Separate from alkalis. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

- A. Control parameters**
- Occupational exposure limits**
- Not applicable.
- Biological exposure indices**
- No exposure indices known.
- B. Appropriate engineering controls**
- Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.
- Environmental exposure controls** Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.
- C. Personal protective equipment**
- Respiratory protection** Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.
- Eye protection** Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.
- Hand protection** Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Skin protection** Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Hygiene measures** Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Section 9. Physical and chemical properties

The conditions of measurement of all properties are at standard temperature and pressure unless otherwise indicated.

A. Appearance

Physical stateLiquid.

ColorClear. Colorless.

B. OdorNot available.

C. Odor thresholdNot available.

D. pH1 to 2

E. Melting/freezing pointNot available.

F. Boiling point or initial boiling point and boiling rangeNot available.

G. Flash point[Product does not sustain combustion.]

	Ingredient name	Closed cup			Open cup		
		°C	°F	Method	°C	°F	Method
	citric acid	100	212				

Fire pointNot available.

Burning timeNot applicable.

Burning rateNot applicable.

H. Evaporation rateNot available.

I. Flammability (solid, gas)Not available.

J. Lower and upper explosive (flammable) limitsNot available.

K. Vapor pressureNot available.

	Ingredient name	Vapor Pressure at 20°C			Vapor pressure at 50°C		
		mm Hg	kPa	Method	mm Hg	kPa	Method
	water	17.5	2.3				
	citric acid	0.000000017	0.0000000023				

L. Solubility in waterNot available.

M. Vapor densityNot available.

N. Relative densityNot available.

O. Partition coefficient: n-octanol/waterNot applicable.

P. Auto-ignition temperatureNot available.

	Ingredient name	°C	°F	Method
	citric acid	1010	1850	

Q. Decomposition temperatureNot available.

SADTNot available.

R. ViscosityDynamic (room temperature): Not available.
Kinematic (room temperature): Not available.
Kinematic (40°C (104°F)): Not available.

Flow time (ISO 2431)Not available.

S. Molecular weightNot applicable.

Particle characteristics

Median particle sizeNot applicable.

Section 10. Stability and reactivity

- | | |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A. Chemical stability | The product is stable. |
| Possibility of hazardous reactions | Under normal conditions of storage and use, hazardous reactions will not occur. |
| B. Conditions to avoid | No specific data. |
| C. Incompatible materials | Attacks many metals producing extremely flammable hydrogen gas which can form explosive mixtures with air.
Reactive or incompatible with the following materials:
alkalis |
| D. Hazardous decomposition products | Under normal conditions of storage and use, hazardous decomposition products should not be produced. |

Section 11. Toxicological information

A. Information on the likely routes of exposure

Routes of entry anticipated: Oral, Dermal, Eyes.

Potential acute health effects

- | | |
|--------------------|---------------------------------------------------|
| Respiratory | May cause respiratory irritation. |
| Oral | No known significant effects or critical hazards. |
| Skin | No known significant effects or critical hazards. |
| Eyes | Causes serious eye irritation. |

Over-exposure signs/symptoms

- | | |
|---------------------|------------------------------------------------------------------------------------------|
| Inhalation | Adverse symptoms may include the following:
respiratory tract irritation
coughing |
| Ingestion | No specific data. |
| Skin contact | No specific data. |
| Eye contact | Adverse symptoms may include the following:
pain or irritation
watering
redness |

B. Health hazards

Acute toxicity

- | | |
|--------------------------------|------------------------------------|
| Product/ingredient name | Result |
| CITRIC ACID | Rat - Oral - LD50
3 g/kg |

- | | |
|-------------------------------------|----------------|
| Conclusion/Summary [Product] | Not available. |
|-------------------------------------|----------------|

Skin corrosion/irritation

- | | |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product/ingredient name | Result |
| CITRIC ACID | Rabbit - Skin - Mild irritant
<u>Duration of treatment/exposure:</u> 24 hours
<u>Amount/concentration applied:</u> 500 mg
Rabbit - Skin - Moderate irritant
<u>Amount/concentration applied:</u> 0.5 MI |

- | | |
|-------------------------------------|----------------|
| Conclusion/Summary [Product] | Not available. |
|-------------------------------------|----------------|

Serious eye damage/eye irritation

- | | |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Product/ingredient name | Result |
| CITRIC ACID | Rabbit - Eyes - Severe irritant
<u>Duration of treatment/exposure:</u> 24 hours
<u>Amount/concentration applied:</u> 750 ug |

- | | |
|-------------------------------------|----------------|
| Conclusion/Summary [Product] | Not available. |
|-------------------------------------|----------------|

Respiratory corrosion/irritation

Not available.

Conclusion/Summary [Product]	Not available.
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Respiratory or skin sensitization

Not available.

Skin

Conclusion/Summary [Product]	Not available.
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Respiratory

Conclusion/Summary [Product]	Not available.
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Not available.

Germ cell mutagenicity

Not available.

Conclusion/Summary [Product]	Not available.
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Carcinogenicity

Not available.

Conclusion/Summary [Product]	Not available.
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Reproductive toxicity

Not available.

Conclusion/Summary [Product]	Not available.
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Specific target organ toxicity (single exposure)**Product/ingredient name**

1M Citric Acid

CITRIC ACID

Result

SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE)
(Respiratory tract irritation) - Category 3
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE)
(Respiratory tract irritation) - Category 3

Specific target organ toxicity (repeated exposure)**Product/ingredient name**

CITRIC ACID

Result

SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) -
Category 2

Aspiration hazard

Not available.

Potential chronic health effects

Not available.

Conclusion/Summary [Product]	Not available.
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General

No known significant effects or critical hazards.

Carcinogenicity

No known significant effects or critical hazards.

Mutagenicity

No known significant effects or critical hazards.

Reproductive toxicity

No known significant effects or critical hazards.

Numerical measures of toxicity**Acute toxicity estimates**

Product/ingredient name	Oral (mg/kg)	Dermal (mg/kg)	Inhalation (gases) (ppm)	Inhalation (vapors) (mg/l)	Inhalation (dusts and mists) (mg/l)
CITRIC ACID	3000	N/A	N/A	N/A	N/A

Section 12. Ecological information

A. Ecotoxicity

Product/ingredient name	Result
CITRIC ACID	Acute - LC50 - Marine water Crustaceans - Green crab - <i>Carcinus maenas</i> - Adult 160 mg/l [48 hours] <u>Effect</u> : Mortality
Conclusion/Summary [Product]	Not available.

B. Persistence/degradability

Not available.	
Conclusion/Summary [Product]	Not available.

C. Bioaccumulative potential

Product/ingredient name	LogP _{ow}	BCF	Potential
citric acid	-1.8	-	Low

D. Mobility in soil

Soil/Water partition coefficient	Not available.
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E. <u>Other adverse effects</u>	No known significant effects or critical hazards.
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Section 13. Disposal considerations

A. <u>Disposal methods</u>	The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.
B. <u>Disposal precautions</u>	This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

UN

A. <u>UN number</u>	Not regulated.
B. <u>Proper shipping name</u>	Not regulated.
C. <u>Classes</u>	Not regulated.
D. <u>Packing group</u>	Not regulated.
E. <u>Marine pollutant</u>	No.
F. <u>Additional information</u>	-
Label	

IMDG

A. <u>UN number</u>	Not regulated.
B. <u>Proper shipping name</u>	Not regulated.
C. <u>Classes</u>	Not regulated.
D. <u>Packing group</u>	Not regulated.
E. <u>Marine pollutant</u>	No.
F. <u>Additional information</u>	-
Label	

IATA

A. <u>UN number</u>	Not regulated.
B. <u>Proper shipping name</u>	Not regulated.

C. Classes	Not regulated.
D. Packing group	Not regulated.
E. Marine pollutant	No.
F. Additional information	-
Label	

Special precautions for user **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to IMO instruments Not available.

Section 15. Regulatory information

A. Regulation according to ISHA

ISHA article 117 (Harmful substances prohibited from manufacture) None of the components are listed.

ISHA article 118 (Harmful substances requiring permission) None of the components are listed.

Exposure Limits of Chemical Substances and Physical Factors

None of the components have an OEL.

ISHA Enforcement Regs Annex 19 (Exposure standards established for harmful factors) None of the components are listed.

ISHA Enforcement Regs Annex 21 (Harmful factors subject to Work Environment Measurement) None of the components are listed.

ISHA Enforcement Regs Annex 22 (Harmful Factors Subject to Special Health Check-up) None of the components are listed.

Standard of Industrial Safety and Health Annex 12 (Hazardous substances subject to control) None of the components are listed.

B. Regulation according to Chemicals Control Act

Article 11 (TRI) None of the components are listed.

Article 18 Prohibited (K-Reach Article 27) None of the components are listed.

Article 19 Candidate substances subject to authorization (K-Reach Article 25) None of the components are listed.

Article 19 Subject to authorization (K-Reach Article 25) None of the components are listed.

Article 20 Toxic Chemicals (K-Reach Article 20) Not applicable

Article 20 Restricted (K-Reach Article 27) None of the components are listed.

Article 39 (Accident Precaution Chemicals)

Not listed.


MoE 2021-51 - Regulations on the quantity of toxic substances, restricted substances, prohibited substances and permitted substances

Not listed.

Existing Chemical Substances Subject to Registration None of the components are listed.

C. Dangerous Materials Safety Management Act	Not applicable.
D. Wastes regulation	Dispose of contents and container in accordance with all local, regional, national and international regulations.
E. Regulation according to other foreign laws	
Article 2 of Youth Protection Act on Substances Hazardous to Youth	Not applicable.
International regulations	
<u>Chemical Weapon Convention List Schedules I, II & III Chemicals</u>	
Not listed.	
<u>Montreal Protocol</u>	
Not listed.	
<u>Stockholm Convention on Persistent Organic Pollutants</u>	
Not listed.	
<u>Rotterdam Convention on Prior Informed Consent (PIC)</u>	
Not listed.	
<u>UNECE Aarhus Protocol on POPs and Heavy Metals</u>	
Not listed.	
<u>Inventory list</u>	
Republic of Korea	All components are listed or exempted.
United States	All components are active or exempted.
China	All components are listed or exempted.
Japan	Japan inventory (CSCL): All components are listed or exempted. Japan inventory (ISHL): Not determined.

Section 16. Other information

A. References	
B. First issue date	24 October 2024
C. Date of issue/Date of revision	24 October 2024 / 20 November 2025
D. Version	1.01
Date of printing	20 November 2025
	sds_author@cytiva.com
E. Other	
 Indicates information that has changed from previously issued version.	
Key to abbreviations	<p>ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor GHS = Globally Harmonized System of Classification and Labelling of Chemicals IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution) N/A = Not available UN = United Nations</p>

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.