



SAFETY DATA SHEET

United States

Section 1. Identification

Product name

**CDM4PERMAb™ Recommended additions:
3.2 g/L Sodium Bicarbonate, 0.5 g/L
Poloxamer 188, 4 mM L-Glutamine**

Catalogue Number

SH30872.01



9 0 S H 3 0 8 7 2 . 0 1

Other means of identification

Not available.

Product type

Powder.

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

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

Supplier / Manufacturer

Cytiva Austria
Kremlstr. 5
4061 Pasching
AUSTRIA
Tel. (+43) 7229 64865
Fax (+43) 7229 64866

HyClone Laboratories
925 West 1800 South
Logan, Utah 84321
Phone: (435) 792-8000

Cytiva Singapore
1 Maritime Square #13-01
Harbourfront Centre
Singapore 099253

Cytiva Singapore
25 Tuas South Street 1
Singapore 638034

Cytiva
Amersham Place
Little Chalfont
Buckinghamshire
HP7 9NA United Kingdom
+44 1494 508000

Cytiva USA
100 Results Way
Marlborough, MA 01752
1-800-526-3593

In case of emergency

INFOTRAC - 24 Hour number: 1-800-535-5053

Outside of the United States, call 24 Hour number: 001-352-323-3500 (Call Collect)

Section 2. Hazards identification

OSHA/HCS status

This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture

AQUATIC HAZARD (LONG-TERM) - Category 3

Percentage of the mixture consisting of ingredient(s) of unknown hazards to the aquatic environment: 44%

GHS label elements

Signal word

No signal word.

Hazard statements

Harmful to aquatic life with long lasting effects.

Precautionary statements



Prevention	Avoid release to the environment.
Response	Not applicable.
Storage	Not applicable.
Disposal	Dispose of contents and container in accordance with all local, regional, national and international regulations.
Hazards not otherwise classified	None known.
Hazards identified when used	No known significant effects or critical hazards.

Section 3. Composition/information on ingredients

Substance/mixture			
Other means of identification			
Ingredient name	Synonyms	%	Identifiers
L-serine	2-Serine; serine; Serine, L-; 2-AMINO- 3-HYDROXYPROPANOIC ACID, (S)-; BETA-HYDROXYALANINE; 2-Amino- 3-hydroxypropanoic acid; 2-Aminon- 3-hydroxypropionic acid; D,L-Serine; (S)-2-Amino-3-hydroxypropanoic acid; SERINE PURISS, L-	≥1 - ≤5	CAS: 56-45-1
L-valine	2-Valine; 2-Amino-3-methylbutanoic acid; valine; Valine, L-; ALPHA- AMINO-BETA-METHYLBUTYRIC ACID, L-; ALPHA- AMINOISOVALERIC ACID, L-(+)-; VALINE, (S)-; 2-AMINO- 3-METHYLBUTANOIC ACID, (S)-; 2-AMINO-3-METHYLBUTYRIC ACID, (S)-; ALPHA-AMINO-BETA- METHYLBUTYRIC ACID, (S)-; 2-Amino-3-methylbutyric acid	≥1 - ≤5	CAS: 72-18-4
copper sulphate pentahydrate	copper sulphate penta-hydrate; copper sulphate pentahydrate; Sulfuric acid, copper(2+) salt (1:1), pentahydrate; Copper sulfate, pentahydrate; Sulfuric acid copper(2+) salt (1:1), pentahydrate; Copper sulphate, pentahydrate; copper(II) sulfate pentahydrate; copper sulfate pentahydrate; Copper(II) sulfate, pentahydrate (1:1:5); copper sulfate; COPPER(II) SULFATE, PENTAHYDRATE	≤0.1	CAS: 7758-99-8
Copper chloride (CuCl ₂), dihydrate	Cupric chloride, dihydrate; Copper (II) chloride, dihydrate; copper dichloride hydrate; Copper(2+) chloride dihydrate; Copper chloride, dihydrate; Cupric chloride dihydrate; Coppertrace; Copper chloride dihydrate; Copper chloride (CuCl ₂), dihydrate; Copper dichloride dihydrate; Copper (II) Chloride Dihydrate	≤0.1	CAS: 10125-13-0

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

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

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

Section 4. First aid measures

Description of necessary first aid measures

Eye contact	Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Get medical attention if irritation occurs.
Inhalation	Remove victim to fresh air and keep at rest in a position comfortable for breathing. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
Skin contact	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur.



Ingestion Wash out mouth with water. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Do not induce vomiting unless directed to do so by medical personnel.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the eyes.

Inhalation Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the nose, throat and lungs.

Skin contact No known significant effects or critical hazards.

Ingestion No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact Adverse symptoms may include the following:
irritation
redness

Inhalation Adverse symptoms may include the following:
respiratory tract irritation
coughing

Skin contact No specific data.

Ingestion No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments No specific treatment.

Protection of first-aiders No action shall be taken involving any personal risk or without suitable training.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media None known.

Specific hazards arising from the chemical This material is harmful to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous thermal decomposition products Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides
phosphorus oxides
halogenated compounds
metal oxide/oxides

Special protective actions 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.

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.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel 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 dust. Put on appropriate personal protective equipment.

For emergency responders If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

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). Water polluting material. May be harmful to the environment if released in large quantities.

Methods and materials for containment and cleaning up

Small spill Move containers from spill area. Vacuum or sweep up material and place in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor.



Large spill	Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Vacuum or sweep up material and place in a designated, labeled waste container. Avoid creating dusty conditions and prevent wind dispersal. Dispose of via a licensed waste disposal contractor.
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Section 7. Handling and storage

Precautions for safe handling

Protective measures	Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing dust. Avoid release to the environment. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.
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.
Conditions for safe storage, including any incompatibilities	Store between the following temperatures: 2 to 8°C (35.6 to 46.4°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. 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

Control parameters

Occupational exposure limits

Ingredient name

L-serine
L-valine
copper sulphate pentahydrate

Exposure limits

None.
None.
CAL OSHA PEL (United States, 1/2025) [copper salts]
TWA 8 hours: 1 mg/m³ (as Cu). Form: dust and mist.
ACGIH TLV (United States, 1/2024) [copper dusts and mists]
TWA 8 hours: 1 mg/m³ (as Cu). Form: Dust and mist.
None.

Copper chloride (CuCl₂), dihydrate

Biological exposure indices

No exposure indices known.

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.

Individual protection measures

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.

Eye/face 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: safety glasses with side-shields. If operating conditions cause high dust concentrations to be produced, use dust goggles.

Skin protection

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.

Body 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.



Other skin protection	Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
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.

Section 9. Physical and chemical properties

Appearance

Physical state	Solid. [Powder.]
Color	White. to Off-white.
Odor	Not available.
Odor threshold	Not available.
pH	5 to 7 [Conc. (% w/w): 1.7%]
Melting point/freezing point	Not available.
Boiling point or initial boiling point and boiling range	Not available.
Flash point	Not applicable.
Burning time	Not available.
Burning rate	Not available.
Evaporation rate	Not available.
Flammability	Not available.
Lower and upper explosive (flammable) limits	Not applicable.
Vapor pressure	Not available.
Relative vapor density	Not applicable.
Relative density	Not available.
Solubility in water	Not available.
Partition coefficient: n-octanol/water	Not applicable.
Auto-ignition temperature	Not applicable.
Decomposition temperature	Not available.
SADT	Not available.
Viscosity	Dynamic (room temperature): Not available. Kinematic (room temperature): Not available. Kinematic (40°C (104°F)): Not available.
Flow time (ISO 2431)	Not available.

Particle characteristics

Median particle size	Not available.
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Section 10. Stability and reactivity

Reactivity	No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	The product is stable.
Possibility of hazardous reactions	Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	No specific data.
Incompatible materials	No specific data.
Hazardous decomposition products	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result
L-serine	Rat - Oral - LD50 14 g/kg
L-valine	Rat - Oral - LD50 2000 mg/kg
copper sulphate pentahydrate	Rat - Oral - LD50 300 mg/kg



Conclusion/Summary Not available.
[Product]

Skin corrosion/irritation

Not available.

Conclusion/Summary Not available.
[Product]

Ingredient name

L-serine

L-valine

Conclusion/Summary

May cause skin irritation.
May cause skin irritation.

Serious eye damage/eye irritation

Not available.

Conclusion/Summary Not available.
[Product]

Ingredient name

L-serine

L-valine

Conclusion/Summary

May cause eye irritation.
May cause eye irritation.

Respiratory corrosion/irritation

Not available.

Conclusion/Summary Not available.
[Product]

Respiratory or skin sensitization

Not available.

Skin

Conclusion/Summary Not available.
[Product]

Respiratory

Conclusion/Summary Not available.
[Product]

Germ cell mutagenicity

Not available.

Conclusion/Summary Not available.
[Product]

Carcinogenicity

Not available.

Conclusion/Summary Not available.
[Product]

Reproductive toxicity

Not available.

Conclusion/Summary Not available.
[Product]

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)



Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure Routes of entry anticipated: Oral, Dermal, Inhalation, Eyes.

Potential acute health effects

Eye contact	Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the eyes.
Inhalation	Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the nose, throat and lungs.
Skin contact	No known significant effects or critical hazards.
Ingestion	No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

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

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

Short term exposure

Potential immediate effects	Not available.
Potential delayed effects	Not available.

Long term exposure

Potential immediate effects	Not available.
Potential delayed effects	Not available.

Potential chronic health effects

Not available.

Conclusion/Summary [Product]	Not available.
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General	Repeated or prolonged inhalation of dust may lead to chronic respiratory irritation.
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)
CDM4PERMAB™	68909.2	117564.7	N/A	N/A	N/A
L-serine	14000	N/A	N/A	N/A	N/A
L-valine	2000	N/A	N/A	N/A	N/A
copper sulphate pentahydrate	481	N/A	N/A	N/A	N/A

Section 12. Ecological information

Toxicity

Product/ingredient name	Result
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L-serine	Acute - EC50 Daphnia 83 mg/l [48 hours] Acute - NOEC Algae 1000 mg/l [72 hours]
L-valine	LC50 Fish 10000 mg/l [96 hours]
copper sulphate pentahydrate	Acute - EC50 - Fresh water US EPA Daphnia - Water flea - <i>Daphnia magna</i> Age: 1 182 ppb [48 hours] <u>Effect:</u> Intoxication
Copper chloride (CuCl ₂), dihydrate	Acute - LC50 - Fresh water US EPA Fish - Rainbow trout,donaldson trout - <i>Oncorhynchus mykiss</i> Weight: 0.6 g 0.032 ppm [96 hours] <u>Effect:</u> Mortality
	Acute - EC50 - Marine water US EPA Algae - Diatom - <i>Skeletonema costatum</i> Age: 3 days 9.52 ppb [72 hours] <u>Effect:</u> Population
	Chronic - NOEC - Marine water US EPA Crustaceans - Harpacticoid copepod - <i>Tisbe battagliai</i> Age: <24 hours 18 ppb [21 days] <u>Effect:</u> Mortality

Conclusion/Summary
[Product] Not available.

Ingredient name

L-serine
L-valine

Conclusion/Summary

Naturally occurring substance
Naturally occurring substance

Persistence and degradability

Product/ingredient name
L-valine

Result

82% [28 days]

Ingredient name

L-serine
L-valine

Conclusion/Summary

Not expected to bioaccumulate. Naturally occurring substance
Not expected to bioaccumulate. Naturally occurring substance

Product/ingredient name
L-valine

Aquatic half-life

-

Photolysis

-

Biodegradability

Readily

Bioaccumulative potential

Product/ingredient name
L-serine
L-valine

BCF

0.609

Potential

Low

0.846

Low

Mobility in soil

Soil/Water partition coefficient Not available.

Other adverse effects

No known significant effects or critical hazards.



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Section 13. Disposal considerations

Disposal methods

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. 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

Product is not regulated as dangerous goods for transport.

Section 15. Regulatory information

U.S. Federal regulations

TSCA 4(a) proposed test rules: glycine

TSCA 8(a) PAIR: ammonium trioxovanadate

TSCA 8(a) CDR Exempt/Partial exemption: Not determined

Clean Water Act (CWA) 307: Sulfuric acid copper(2+) salt (1:1), hydrate (1:5); Sulfuric acid, zinc salt (1:1), heptahydrate; Copper chloride (CuCl₂), dihydrate; sodium selenite; Copper chloride (CuCl₂), dihydrate; Cadmium chloride, hydrate (2:5)

Clean Water Act (CWA) 311: ammonium iron(III) citrate; disodium hydrogenorthophosphate; Sulfuric acid copper(2+) salt (1:1), hydrate (1:5); Sulfuric acid, zinc salt (1:1), heptahydrate; Copper chloride (CuCl₂), dihydrate; acetic acid; sodium selenite; Copper chloride (CuCl₂), dihydrate; Cadmium chloride, hydrate (2:5)

TSCA 12(b) - Chemical export notification

Not applicable.

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)

Listed

Clean Air Act Section 602 Class I Substances

Not listed

Clean Air Act Section 602 Class II Substances

Not listed

DEA List I Chemicals (Precursor Chemicals)

Not listed

DEA List II Chemicals (Essential Chemicals)

Not listed

SARA 302/304

Composition/information on ingredients

Name	%	EHS	SARA 302 TPQ (lbs)	SARA 304 RQ (gallons)	SARA 304 RQ (gallons)
ergocalciferol (ISO)	<0.0002	Yes.	1000 / 10000	-	1000
sodium selenite	<0.00009675	Yes.	100 / 10000	-	100
SARA 304 RQ			114843525.7 lbs / 52138960.7 kg		

SARA 311/312

Classification Not applicable.

Composition/information on ingredients

Name	%	Classification
L-valine	<1.6	ACUTE TOXICITY (oral) - Category 4

State regulations

Massachusetts None of the components are listed.

New York None of the components are listed.

New Jersey The following components are listed: ETHYL ALCOHOL

Pennsylvania None of the components are listed.

California Prop. 65

This product does not require a Safe Harbor warning under California Prop. 65.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol



Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

United States Not determined.

Canada inventory Not determined.

Section 16. Other information

National Fire Protection Association (U.S.A.)



Procedure used to derive the classification

Classification

AQUATIC HAZARD (LONG-TERM) - Category 3

Justification

Calculation method

History

Date of printing 2/17/2026

Date of issue/Date of revision 2/17/2026

Date of previous issue No previous validation

Version 1

sds_author@cytiva.com

Key to abbreviations

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

References

Not available.

Indicates information that has changed from previously issued version.

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.

