SAFETY DATA SHEET (SDS)

in accordance with Regulation (EC) No 1907/2006 (REACH), Annex II — Regulation (EU) 2020/878

Date: 03.11.2026 | Version: 14 | EN

citric acid

2-hydroxypropane-1,2,3-tricarboxylic acid

CAS 77-92-9

$C_6H_8O_7$ | EC 201-069-1

MOLAR MASS	LOGP
192.12	-1.64

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HAZARD CLASSIFICATION (GHS / CLP)



Warning

H319 | H335

Hazard class scope limited to the harmonised classification (CLP Annex VI); classes outside the harmonised entry may require supplier self-classification (CLP Art. 4(3)) — verify with the supplier safety data sheet.

1. Identification of the substance/mixture and of the company/undertaking

1.1 Substance name	citric acid
1.1 IUPAC name	2-hydroxypropane-1,2,3-tricarboxylic acid
1.1 CAS number	77-92-9
1.1 EC number	201-069-1
1.1 PubChem CID	311
1.1 InChIKey	KRKNYBCHXYNGOX-UHFFFAOYSA-N
1.1 SMILES	C(C(=O)O)C(CC(=O)O)(C(=O)O)O
1.1 Molecular formula	$C_6H_8O_7$ [7]
1.1 Molar mass	192.12 g/mol [7]
1.1 Exact mass	192.0270 Da [7]

1.2 Uses

For laboratory and research purposes. Not for use in the production of food, medicines or cosmetics without appropriate authorisation.

1.3 Details of the supplier

REFERENCE COPY — NO SUPPLIER DETAILS — NOT FOR DISTRIBUTION	Supplier details are not included in this reference copy. The supplier placing the substance on the market must complete this section and remains responsible for the sheet under REACH. MolGod.org prepares documentation and is not the supplier of this substance.

1.4 Emergency telephone number

Emergency telephone	112 (EU-wide emergency number)

Contact the poison centre designated in the country of placing on the market (CLP Art. 45).

2. Hazards identification

GHS:



PPE:



Warning

Hazard statements (H) [3][4][9]

H335	May cause respiratory irritation
H319	Causes serious eye irritation

Precautionary statements (P) [3][4][9]

P261	Avoid breathing dust/fume/gas/mist/vapours/spray
P264	Wash thoroughly after handling
P271	Use only outdoors or in a well-ventilated area
P280	Wear protective gloves/protective clothing/eye protection/face protection
P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes; Remove contact lenses, if present and easy to do. Continue rinsing
P312	Call a POISON CENTER or doctor/physician if you feel unwell
P337+P313	If eye irritation persists: Get medical advice/attention
P403+P233	Store in a well-ventilated place: Keep container tightly closed
P405	Store locked up
P501	Dispose of contents/container to an approved waste collection point

Hazard class scope limited to the harmonised classification (CLP Annex VI); classes outside the harmonised entry may require supplier self-classification (CLP Art. 4(3)) — verify with the supplier safety data sheet.

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3. Composition/information on ingredients

Substance type	pure substance
CAS Number	77-92-9
EC number	201-069-1
Molecular formula	$C_6H_8O_7$
Concentration	≥99% (typical reagent-grade purity — to be confirmed by the supplier's specification)
Clp index no	607-750-00-3

4. First aid measures



Inhalation

Move the affected person to fresh air. Keep at rest. If not breathing: artificial respiration (qualified personnel only). [1][2][15]

Skin contact

Remove contaminated clothing. Rinse skin with soap and water (min. 15 minutes). [1][2][15]

Eye contact

Rinse eyes with running water (min. 15 minutes). Remove contact lenses if possible. If irritation persists — consult an ophthalmologist. [1][2][15]

Ingestion

Do NOT induce vomiting (unless directed by a physician). Rinse mouth with water. Never give anything by mouth to an unconscious person. Emergency number: 112 (EU-wide). Contact the poison centre designated in your country (CLP Art. 45). [1][2][15]

Symptoms and effects

cough, shortness of breath, headache, dizziness; eye irritation and watering. [3][9]

Notes for physician

Requires verification

Emergency numbers: Emergency: 112 (EU-wide). Poison centre: as designated in the country of placing on the market (CLP Art. 45).

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5. Firefighting measures

Suitable extinguishing media	Adapt extinguishing media to surroundings. CO2, dry powder, foam.
Unsuitable extinguishing media	No specific restrictions.
Specific hazards	Thermal decomposition products: CO, CO2. [16]
Advice for firefighters	Use self-contained breathing apparatus (SCBA). Full protective suit.
Flash Point	100°C [7]
Auto-ignition temperature	1010°C [7]

6. Accidental release measures

Personal precautions	Use personal protective equipment (see Section 8). Avoid breathing dust. [1][2][15]
Environmental precautions	Prevent entry into sewers, groundwater and surface water. [1][2][15]
Methods for containment and cleaning up	1. Collect dry with a broom/dustpan 2. Dampen residues with water + wipe up 3. Neutralise (if >100g) with baking soda — reacts with CO2 effervescence 4. Wipe dry
Related sections	8; 13
Large spill	1. Collect mechanically into paper sacks 2. May be disposed of as non-hazardous waste (organic biodegradable) 3. Solutions >10% — neutralise with NaHCO3, monitor pH 6-8
Absorbent	dry sweeping then water rinse
HAZMAT response required	No
Required PPE	Gloves: nitrile standard; Safety goggles: Yes; Protective clothing: lab coat

7. Handling and storage

Precautions	Work in a fume hood or with adequate ventilation. No eating, drinking or smoking in the work area. [1][2][15]
Storage temperature	Store at temperature below 40°C. [1][2][15]
Humidity	Store in a dry place (<60% RH). [1][2][15]
Light	Protect from direct sunlight. [1][2][15]

Hygroscopic — store in a dry, closed container.

Incompatible materials	Strong oxidizers, strong bases, Base metals (hydrogen evolution). [16]

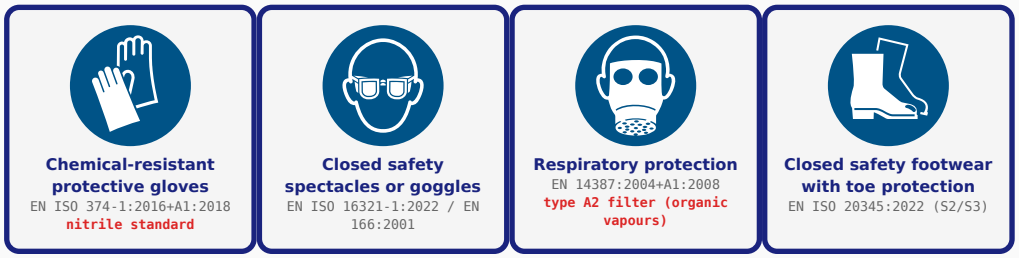
8. Exposure controls/personal protection

8.1 Control parameters

OEL — NDS (Poland)	No NDS (OEL) value in the available working list — verify in the current MRPiPS regulation before use; do not assume the absence of a limit value.
OEL (EU)	The EU OEL value has not been verified against the available dataset — check the IOELV/BOELV directives; do not assume the absence of a value.
DNEL	No data available.
PNEC	No data available.

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8.2 Personal protective equipment (PPE) [5][6][17]



Chemical-resistant protective gloves
EN ISO 374-1:2016+A1:2018
nitrile standard

Closed safety spectacles or goggles
EN ISO 16321-1:2022 / EN 166:2001

Respiratory protection
EN 14387:2004+A1:2008
type A2 filter (organic vapours)

Closed safety footwear with toe protection
EN ISO 20345:2022 (S2/S3)

9. Physical and chemical properties

Property (item 9.1)	Value	Source
Physical state	solid (white crystalline powder)	
Colour	white	
Odour	bezwonny	
pH (1% aqueous solution)	No data available.	
Melting point	153°C (bezwodny — CRC Handbook of Chemistry and Physics, 91st ed. (2010), p. 3-120) [8] [7]	
Boiling point	175°C	
Flash point	100°C (experimental data) [7]	
Flammability	No data available.	
Lower and upper explosion limit	Not applicable (REACH 9.1(g))	
Density (20°C)	1.665 g/cm³ (20 °C, bezwodny — CRC Handbook of Chemistry and Physics, 86th ed. (2005), p. 3-120) [7]	
Vapour pressure	0.0001 [value carried over from previous version, 2026-10-19]	
Relative vapour density	Not applicable (REACH 9.1(q))	
Dynamic viscosity	2.549 mPa·s [7]	
Kinematic viscosity	Not applicable (REACH 9.1(l))	
Refractive index nD^{20}	1.493 (experimental data) [7]	
Auto-ignition temperature	1010°C (experimental data) [7]	
Decomposition temperature	No data available.	
Dissociation constant (pKa)	pKa_1 = 3.13 / pKa_2 = 4.76 / pKa_3 = 6.4	
Water solubility	383 g/L (25 °C) — Yalkowsky, He, Jain, Handbook of Aqueous Solubility Data, 2nd ed. (2010), p. 275	
Particle characteristics	The particle size distribution has not been determined for this commercial form — required under Annex II 9.1(r); to be completed from the supplier's specification.	
Partition coefficient n-octanol/water (log value)	-1.64 [21]	

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Property (item 9.1)	Value	Source
Molar mass	192.12 g/mol [7]	
Molecular formula	$C_6H_8O_7$ [7]	
Lipinski rule (RO5)	PASS	

Where a property above reads "No data available", no measured value was found in the public sources consulted for this substance. The property has not been determined by MolGod.org and no value is inferred. "Not applicable" means the property has no meaning for this substance in the form supplied.

10. Stability and reactivity

Reactivity	Stable under normal storage and handling conditions.
Chemical stability	Thermally stable under recommended conditions.
Hazardous reactions	No hazardous reactions known under normal conditions.
Conditions to avoid	High temperatures, direct sunlight, moisture.
Incompatible materials	Strong oxidizers, strong bases, Base metals (hydrogen evolution).
Decomposition products	Thermal decomposition products: CO, CO2.

11. Toxicological information

LD50 (oral)	3000 mg/kg (rat) [10]
LD50 (dermal)	No data available.
LC50 (inhalation)	No data available.
Skin irritation	Not classified for this hazard (outside the scope of the harmonised classification in CLP Annex VI; verify supplier self-classification) [3][9]
Eye irritation	Category 2 — eye irritation.
Sensitisation	Not classified for this hazard (outside the scope of the harmonised classification in CLP Annex VI; verify supplier self-classification) [3][9]
Mutagenicity	Not classified for this hazard (outside the scope of the harmonised classification in CLP Annex VI; verify supplier self-classification) [3][9]
Carcinogenicity	Not classified for this hazard (outside the scope of the harmonised classification in CLP Annex VI; verify supplier self-classification) [3][9]
IARC classification (carcinogenicity)	No individual IARC monograph for this CAS — this is not confirmation of the absence of carcinogenicity (cf. CLP/GHS classification in section 2).
Reproductive toxicity	Not classified for this hazard (outside the scope of the harmonised classification in CLP Annex VI; verify supplier self-classification) [3][9]
STOT — single exposure	Category 3 (H335): May cause respiratory irritation. [3][9]
STOT — repeated exposure	Not classified for this hazard (outside the scope of the harmonised classification in CLP Annex VI; verify supplier self-classification) [3][9]
Aspiration hazard	Not classified for this hazard (outside the scope of the harmonised classification in CLP Annex VI; verify supplier self-classification) [3][9]

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12. Ecological information

Aquatic toxicity	LC_{50} (fish, 96h): 440 mg/L (Lepomis macrochirus, 96h). EC_{50} (Daphnia): 120 mg/L (Daphnia magna, 48h)
Persistence / biodegradability	Readily biodegradable (OECD 301B, >70% in 28 days). Natural metabolite of the Krebs cycle.
Bioaccumulative potential	log Kow = -1.64. Low bioaccumulation potential (log Kow < 4.5 — PBT/vPvB screening criterion per ECHA Guidance R.11). [18][19]
Mobility in soil	No data available.
PBT/vPvB assessment	Does not meet PBT/vPvB criteria
Endocrine disrupting properties	No information.

13. Disposal considerations

Disposal method	Safe disposal as non-hazardous waste. Small quantities (<1kg) may be discharged to the sewer after neutralization with NaOH (dilute 1:100).
Waste code (EWC)	07 06 99 [14]
Packaging	Cleaned packaging may be recycled. Contaminated packaging must be treated as hazardous waste.
BDO required	No

14. Transport information

UN number	Not assigned [12]
Environmental hazard	Not classified as environmentally hazardous for transport (no H400/H410/H411 in CLP Annex VI; no marine pollutant mark required) [3]
Special precautions	Handle as dangerous goods according to the assigned class (ADR/IMDG/IATA); apply the precautions appropriate to that class.
CN/HS code	2918 14 00 [13]
Notes	UN number per the indicated source. Verify the transport class and packing group in ADR Table A / UN Model Regulations before shipment. [12]

15. Regulatory information

SVHC status	SVHC status not verified against the available dataset — check the current ECHA Candidate List; do not assume absence. [1]
REACH Annex XIV	Not verified against the ECHA Authorisation List — check REACH Annex XIV. [1]
REACH Annex XVII	Not confirmed in the available Annex XVII dataset — verify against the current ECHA list before placing on the market; do not assume absence of restriction. [1]
REACH registration	Substance registered under REACH. Tonnage range: >1000 t/a.
EC number type	EINECS
Index number (CLP Annex VI)	No (exempt substance, GRAS — Generally Recognized As Safe)
Harmonised classification	No
Us tsca	Active on TSCA Inventory
Fda status	GRAS (21 CFR 184.1033)

16. Other information

Legal status of classification: harmonised under CLP Annex VI — Reg. (EC) No 1272/2008 (as at the date of issue).Entries with an entry-into-force date after 03.11.2026 were omitted as future (not yet applicable).

Data aggregated automatically from public reference databases (PubChem, ECHA, NIST and others).

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Scientific citations (10)

Mohammed Riri, Farid Hadhoudi, Mustapha Hor et al.. *Di- and tetranuclear gadolinium (III) complexes of 2-hydroxypropane-1,2,3-tricarboxylic acid and 1,2,2-trimethylcyclopentane-1,3-dicarboxylic acid : identification and characterization*. International Journal of Advanced Chemistry (2017). DOI: 10.14419/ijac.v5i2.8471

4,4′-Bipyridine–2-hydroxypropane-1,2,3-tricarboxylic acid (3/2). Acta Crystallographica Section E (2009). DOI: 10.1107/S1600536809004607

N. Mithil Kumar, K. Kanny. *A Novel Biodegradable Poly (Hydroxybutanedioic Acid-co-2-hydroxypropane-1,2,3-tricarboxylic Acid) Copolymer for Water Treatment Applications*. Open Journal of Organic Polymer Materials (2013). DOI: 10.4236/ojopm.2013.32009

Seong Wei Lee, Musa Najiah. *Antimicrobial Property of 2-Hydroxypropane-1,2,3-Tricarboxylic Acid Isolated from Citrus microcarpa Extract*. Agricultural Sciences in China (2009). DOI: 10.1016/s1671-2927(08)60291-6

C. Muthuselvi, S. Amirthakan, M. Saranya. *Optimization of Molecular Modeling and Spectroscopic Studies of 2-Acetoxybenzoic Acid with 2-Hydroxypropane-1,2,3-Tricarboxylic Acid Crystal*. Current Research in Chemistry (2021). DOI: 10.3923/crc.2021.15.25

Full text of H statements

H335	May cause respiratory irritation
H319	Causes serious eye irritation

Full text of P statements

P261	Avoid breathing dust/fume/gas/mist/vapours/spray
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P280	Wear protective gloves/protective clothing/eye protection/face protection
P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes; Remove contact lenses, if present and easy to do. Continue rinsing
P312	Call a POISON CENTER or doctor/physician if you feel unwell
P337+P313	If eye irritation persists: Get medical advice/attention
P403+P233	Store in a well-ventilated place: Keep container tightly closed
P405	Store locked up
P501	Dispose of contents/container to an approved waste collection point

Abbreviations

ADR	European Agreement concerning the International Carriage of Dangerous Goods by Road
ATE	Acute Toxicity Estimate
CAS	Chemical Abstracts Service
CLP	Classification, Labelling and Packaging (Reg. (EC) 1272/2008)
CMR	Carcinogenic, Mutagenic, toxic to Reproduction
DNEL	Derived No-Effect Level
EC	European Community number
EPI	Personal protective equipment
GHS	Globally Harmonized System
IATA	International Air Transport Association
IMDG	International Maritime Dangerous Goods Code
SDS	Safety Data Sheet
LC50	Lethal Concentration, 50%
LD50	Lethal Dose, 50%
NDS	Maximum admissible concentration (workplace, PL)
NDSCh	Short-term exposure limit (PL)
OEL	Occupational Exposure Limit
PBT	Persistent, Bioaccumulative and Toxic
PNEC	Predicted No-Effect Concentration

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REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals (Reg. (EC) 1907/2006)
STOT	Specific Target Organ Toxicity
SVHC	Substance of Very High Concern
TPSA	Topological Polar Surface Area
vPvB	very Persistent and very Bioaccumulative

Version history

v14 (03.11.2026)	Based on ECHA harmonised classification (Annex VI to CLP, ATP 23).

References

[1] EP and Council. Reg.(EC) No 1907/2006 (REACH). Art.31, Annex II. OJ EU L 396/2006. URL: https://eur-lex.europa.eu/eli/reg/2006/1907/oj Accessed: 2026-11-03.

[2] European Commission. Reg.(EU) 2020/878 — amending Annex II REACH. OJ EU L 203/2020. From 01.01.2023. URL: https://eur-lex.europa.eu/eli/reg/2020/878/oj Accessed: 2026-11-03.

[3] EP and Council. Reg.(EC) 1272/2008 (CLP) + ATP 23. OJ EU L 353/2008. (2026-07-07) URL: https://eur-lex.europa.eu/eli/reg/2008/1272/oj Accessed: 2026-11-03.

[4] United Nations. GHS Rev.9. ST/SG/AC.10/30/Rev.9. New York and Geneva: United Nations, 2021. URL: https://unece.org/transport/dangerous-goods/ghs-rev9-2021 Accessed: 2026-11-03.

[5] ISO. ISO 7010:2019 — Graphical symbols. Safety signs. URL: https://www.iso.org/standard/72424.html Accessed: 2026-11-03.

[6] ISO. ISO 3864-1:2011 — Safety colours and safety signs. URL: https://www.iso.org/standard/51021.html Accessed: 2026-11-03.

[7] PubChem. National Center for Biotechnology Information (NIH/NLM), chemical compound database. URL: https://pubchem.ncbi.nlm.nih.gov/compound/311

[8] NIST. Chemistry WebBook, SRD 69. National Institute of Standards and Technology. URL: https://webbook.nist.gov/cgi/cbook.cgi?ID=77-92-9

[9] ECHA. European Chemicals Agency — harmonised classification inventory (CLP Annex VI). URL: https://echa.europa.eu

[10] European Commission, Joint Research Centre. IUCLID Dataset: Citric acid (CAS 77-92-9). European Chemicals Bureau, ESIS.

[11] ECHA. REACH Registration Dossier (registered substance, acute toxicity study record). Helsinki: European Chemicals Agency. URL: https://echa.europa.eu/registration-dossier

[12] UNECE. European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), 2025 edition (ECE/TRANS/352). Geneva: United Nations. URL: https://unece.org/adr

[13] European Commission. Combined Nomenclature (Council Regulation (EEC) No 2658/87). Chapter 29. OJ EU L 256. URL: https://eur-lex.europa.eu/eli/reg/1987/2658/oj

[14] European Commission. Decision 2000/532/EC establishing a list of wastes (European Waste Catalogue). OJ EU L 226/3. URL: https://eur-lex.europa.eu/eli/dec/2000/532/oj

[15] European Chemicals Agency (ECHA). Guidance on the Compilation of Safety Data Sheets. Version 4.0. Helsinki: European Chemicals Agency, 2020. URL: https://echa.europa.eu/documents/10162/2324906/sds_en.pdf

[16] Urben, P.G., ed. Bretherick's Handbook of Reactive Chemical Hazards. 8th ed. Oxford: Academic Press.

[17] CEN. Personal protective equipment standards (EN ISO 374-1, EN 166, EN 149, EN 14387, EN ISO 20345). Brussels: European Committee for Standardization.

[18] ECHA. Guidance on Information Requirements and Chemical Safety Assessment, Chapter R.11: PBT/vPvB Assessment. Helsinki: European Chemicals Agency. URL: https://echa.europa.eu/guidance-documents/guidance-on-information-requirements-and-chemical-safety-assessment

[19] European Parliament and Council. Regulation (EC) No 1907/2006 (REACH), Annex XIII — Criteria for the identification of PBT and vPvB substances. OJ EU L 396/2006 (consolidated). URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02006R1907-20140410

[20] U.S. EPA. ECOTOX Knowledgebase. Washington, DC: U.S. Environmental Protection Agency. URL: https://cfpub.epa.gov/ecotox/

[21] Sangster, J. "Octanol-Water Partition Coefficients of Simple Organic Compounds." Journal of Physical and Chemical Reference Data 18, no. 3 (1989): 1111-1229. URL: https://doi.org/10.1063/1.555833

[22] MRiPS Regulation of 12.06.2018 — NDS/NDN. Journal of Laws 2024 item 1017. URL: https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20240001017 Accessed: 2026-11-03.

External links

NIST: https://webbook.nist.gov/cgi/cbook.cgi?ID=77-92-9

ChEMBL: https://www.ebi.ac.uk/chembl/compound_report_card/CHEMBL1261

NFPA 704 (supplementary information — NFPA/USA system; not a required element of an EU safety data sheet under REACH Annex II)



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Generator: Document generated automatically from ECHA harmonised classification (Annex VI to CLP) and public physicochemical databases.
Author: www.MolGod.org — platform for automated safety data sheets (SDS).
Issue date: 03.11.2026 | Document version: 14

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