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SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Product	2-Phosphonobutane-1,2,4-Tricarboxylic Acid 50% (PBTCA)	**Revision date**	2026-11-16
Version	1.0	**Brand**	Richest

SECTION 1: Identification of the substance/mixture and of the company/undertaking

Product name	2-Phosphonobutane-1,2,4-Tricarboxylic Acid 50% (PBTCA)
Synonyms	2-PHOSPHONOBUTANE-1,2,4-TRICARBOXYLIC ACID; 37971-36-1; 2-Phosphono-1,2,4-butanetricarboxylic acid; 1,2,4-Butanetricarboxylic acid, 2-phosphono-; phosphonobutanetricarboxylic acid; BAYHIBIT AM
CAS No.	37971-36-1
EC No.	253-733-5
Molecular formula	C7H11O9P
Molecular weight	270.13 g/mol
Relevant identified uses	Scale and corrosion inhibitor for industrial water treatment
Uses advised against	No specific uses advised against were identified in the reviewed sources.
Company	Richest Group
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SECTION 2: Hazards identification

GHS Classification	Serious eye damage/eye irritation Category 2
Pictogram(s)	GHS07
Signal word	Warning
Hazard statement(s)	H319 Causes serious eye irritation
Precautionary statement(s)	P264; P280; P305+P351+P338; P337+P313
Other hazards	Corrosive to skin and eyes; [eChemPortal: ERMA] An eye irritant; [MSDSonline] The commercial product is a solution that is not irritating to the skin or eyes. [AIHA]

SECTION 3: Composition/information on ingredients

Component	2-Phosphonobutane-1,2,4-Tricarboxylic Acid 50% (PBTCA)
CAS No.	37971-36-1
EC No.	253-733-5
Classification	Serious eye damage/eye irritation Category 2
Concentration	Active components as PBTC 49.0-51.0%

SECTION 4: First-aid measures	
If inhaled	Move the person to fresh air and keep comfortable for breathing. Get medical advice if symptoms occur.
In case of skin contact	Wash with plenty of water. Remove contaminated clothing. Get medical advice if irritation occurs.
In case of eye contact	Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing. Get medical advice if irritation persists.
If swallowed	Rinse mouth. Do not induce vomiting unless directed by medical personnel. Get medical advice if symptoms occur.
Most important symptoms and effects	No data available
Indication of immediate medical attention	Treat symptomatically. Show this safety data sheet to medical personnel.

SECTION 5: Fire-fighting measures	
Suitable extinguishing media	Water spray, foam, dry chemical or carbon dioxide, as appropriate for the surrounding fire
Unsuitable extinguishing media	No data available
Special hazards arising from the chemical	Thermal decomposition can produce carbon oxides, phosphorus oxides and other toxic fumes
Advice for firefighters	Wear self-contained breathing apparatus and protective clothing appropriate for the surrounding fire.

SECTION 6: Accidental release measures	
Personal precautions and emergency procedures	Avoid contact with the material. Ensure adequate ventilation. Wear appropriate personal protective equipment.
Environmental precautions	Prevent uncontrolled release to drains, soil and watercourses.
Methods for containment and cleaning up	Collect mechanically or with a suitable absorbent and place in a suitable closed container for disposal.

SECTION 7: Handling and storage	
Precautions for safe handling	Avoid contact with skin and eyes. Avoid formation or inhalation of dust, mist or vapour as applicable. Wash thoroughly after handling.
Conditions for safe storage, including incompatibilities	Cool, dry, ventilated place away from oxidizing agents and strong bases; shelf life 12 months

SECTION 8: Exposure controls/personal protection	
Occupational exposure limit values	No data available
Biological limit values	No biological limit values were identified in the reviewed sources.
Appropriate engineering controls	Provide adequate ventilation. Eyewash facilities should be available where contact is possible.
Eye/face protection	Use safety eyewear appropriate to the risk of exposure.
Skin and body protection	Wear suitable protective gloves and clothing appropriate to the risk of exposure.
Respiratory protection	Use suitable respiratory protection if exposure limits may be exceeded or dust, mist or vapour is generated.

SECTION 8: Exposure controls/personal protection	
Thermal hazards	No specific thermal hazards were identified in the reviewed sources; see Sections 5 and 10.

SECTION 9: Physical and chemical properties	
Physical state	Colorless transparent liquid
Colour	Colourless to pale yellow
Odour	Slight and characteristic; Bayer product data describes the 50% product as almost odourless
Melting point / freezing point	<0 °C (50% aqueous solution)
Boiling point / boiling range	ca.100-105 °C (50% aqueous solution)
Flammability	Not flammable
Explosion / flammability limits	No data available
Flash point	Not applicable; non-flammable aqueous solution
Auto-ignition temperature	No data available
Decomposition temperature	No data available
pH	1.5-2.0 (1% solution)
Viscosity	17.5±7.5 mPa·s (20 °C, DIN 53015).
Solubility	Soluble in water
Partition coefficient n-octanol/water	LogPow -1.36 for the neat active substance (25 °C, public SDS); not a measured value for the 50% formulation.
Vapour pressure	Approximately 2.3 kPa at 20 °C (as water; ZEELCHEM 121 SDS)
Density and/or relative density	≥1.27 g/cm3 at 20 °C
Relative vapour density	No data available
Particle characteristics	Not applicable (liquid).
Active concentration	PBTCA 50±1% by mass.
Solidifying point	Approximately -15 °C; thawing after solidification due to cold does not reduce product quality.
Freezing point	Approximately -15 °C (solidifying point of the 50% aqueous product)

SECTION 10: Stability and reactivity	
Reactivity	Reacts with alkalis in an exothermic neutralization and corrodes reactive metals; concentrate may corrode mild steel, aluminium and galvanized metals
Chemical stability	Resistant to chlorine, bleach, and bromine and suitable for elevated temperatures and acidic/alkaline conditions; however, hydrolysis occurs under strongly alkaline, high-temperature conditions, with a half-life of approximately 20 h for conversion to orthophosphate in process water at pH 9 and 200 °C. Product quality can be maintained for at least 2 years when stored properly in the original packaging.
Possibility of hazardous reactions	None under normal processing; exothermic neutralization occurs with alkalis
Conditions to avoid	Avoid excessive heat and freezing; store below 40 °C in a dry, well-ventilated place away from direct sunlight

SECTION 10: Stability and reactivity

Incompatible materials	Strong oxidizers, strong alkalis (exothermic), and reactive metals including aluminium, zinc and galvanized steel
Hazardous decomposition products	Carbon oxides and phosphorus oxides

SECTION 11: Toxicological information

Serious eye damage irritation	GHS classification: Serious eye damage/eye irritation Category 2
Health effects	Corrosive to skin and eyes; [eChemPortal: ERMA] An eye irritant; [MSDSonline] The commercial product is a solution that is not irritating to the skin or eyes. [AIHA]
Acute toxicity	Supplier toxicological information reports an oral LD50 in rats of >5,000 mg/kg, indicating relatively low acute oral toxicity.
Skin corrosion irritation	Supplier information reports no irritation to rabbit skin; however, the 50% formulation is acidic, and another public SDS assigns H314 (causes severe skin burns and eye damage). The rabbit skin results cannot be used as a basis for waiving protection for the 50% acidic formulation.
Sensitization	The accessed public SDS/manufacturer information does not provide respiratory or skin sensitization test results or a test basis confirming a negative outcome; the absence of a sensitization classification is not presented as a negative experimental conclusion.
Carcinogenicity	The accessed public information does not provide long-term carcinogenicity studies; the absence of a carcinogenicity classification does not mean that experimental evidence of non-carcinogenicity is available, so no assertion of non-carcinogenicity is made.
Toxicological summary	Acute oral toxicity is low, but the 50% aqueous solution is strongly acidic, and local eye and skin hazards are the principal handling concerns. Low ecotoxicity does not mean that the effects of formulation pH on personnel and receiving waters can be ignored.

SECTION 12: Ecological information

Ecotoxicity	The public SDS reports: Danio rerio 96 h LC50 >1,042 mg/L; Daphnia magna 48 h EC50 >1,071 mg/L; Desmodesmus subspicatus 72 h EC50 >1,081 mg/L; and activated sludge predominantly from domestic sewage, 3 h EC50 >1,000 mg/L. Manufacturer information additionally reports no harmful effects in tests with fish, daphnids, algae, bacteria, earthworms, and midge larvae.
Persistence degradability	PBTC is not readily degradable in standard OECD 301D/302B tests but can degrade under natural conditions: the biodegradation half-life in pond water was 28 d, and only 0.3% of radiolabelled PBTC remained in the water after 208 d; the manufacturer reports faster degradation in the presence of a second carbon source and small amounts of inorganic phosphate. Photolysis can occur in water, and the half-life may be only a few hours in the presence of trace iron or nitrate, depending on light intensity and water composition.
Bioaccumulative potential	The neat substance has a LogPow of -1.36 at 25 °C, indicating low bioaccumulation potential; this is a judgement based on the partition coefficient, and no substance-specific measured BCF was identified.
Mobility in soil	Manufacturer tests show that >95% of PBTC can be adsorbed by activated sludge; in standing water over quiescent sediment, the half-life for removal by adsorption is 5 d, shortening to a few hours when the sediment is suspended. In an independent study, the maximum adsorption capacities of kaolinite and montmorillonite for PBTC at pH 3.0 and 298 K were 72.297 and 121.163 mg/g, respectively, consistent with Langmuir monolayer adsorption and pseudo-second-order kinetics and indicating substantial partitioning to sludge, sediment, and clay.

SECTION 12: Ecological information

Other adverse effects	Manufacturer trials do not expect PBTC to remobilize heavy metals from sediment. Phosphonate reviews note that non-biological degradation can release phosphorus and contribute to eutrophication; high-strength discharges such as reverse-osmosis concentrate still require treatment and must not be discharged directly merely because acute aquatic toxicity is low.

SECTION 13: Disposal considerations

Product disposal methods	Dispose of contents in accordance with applicable local, regional and national regulations. Do not discharge untreated product to the environment.
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal in accordance with local regulations.

SECTION 14: Transport information

UN Number (ADR/RID, IMDG, IATA)	Not regulated as dangerous goods
UN Proper Shipping Name	Not regulated as dangerous goods
Transport hazard class(es)	Not regulated as dangerous goods
Packing group	Not regulated as dangerous goods
Environmental hazards / Marine pollutant	No
Special precautions for user	Keep containers closed and secured during transport. Follow local transport requirements.

SECTION 15: Regulatory information

Safety, health and environmental regulations specific for the product	No data available

SECTION 16: Other information

Full text of H-Statements	H319 Causes serious eye irritation
Revision date	2026-11-16
Version	1.0

SECTION 16: Other information

References	Supplier technical documents, public SDS/COA/TDS and regulatory sources reviewed. Public data citations are listed below. Public data sources: PubChem 2-Phosphonobutane-1,2,4-tricarboxylic acid (CID 61973): https://pubchem.ncbi.nlm.nih.gov/compound/61973 | 2-Phosphonobutane-1,2,4-Tricarboxylic Acid (PBTCA) — Product and Environmental Information: https://atamankimya.com/sayfalaralfabe.asp?LanguageID=2&cid=3&id=2867&id2=4928 | 2-Phosphonobutane-1,2,4-Tricarboxylic Acid — Technical and Toxicological Information: https://kefmann.com/product/2-phosphonobutane-124-tricarboxylic-acid-2-fosfonobtan-124-trikarbokslk/ | 2-Phosphonobutane-1,2,4-Tricarboxylic Acid — Safety Data Sheet: https://www.chemicalbook.com/msds/2-phosphonobutane-1-2-4-tricarboxylic-acid.htm | Exploration of adsorption mechanism of 2-phosphonobutane-1,2,4-tricarboxylic acid onto kaolinite and montmorillonite via batch experiment and theoretical studies: https://pubmed-d.ncbi.nlm.nih.gov/33264909/ | Environmental chemistry of phosphonates: http://publicationslist.org.s3.amazonaws.com/data/nowack/ref-38/Nowack%20WatRes%20review%20(2003).pdf | PBTC 50% ZEELCHEM 121 - Safety Data Sheet: https://zeelproduct.com/products/pbtc-msds.html | PBTC 50% ZEELCHEM 121 - Technical Data Sheet: https://zeelproduct.com/products/pbtc-tds.html | PBTC - Bayer 50% product data: https://kefmann.com/product/pbtc-2/ | PBTC 50% - Product physical properties: https://www.sinobiochemistry.com/Water-treatment-scale-and-Corrosion-Inhibitor-PBTCA-50-CAS-37971-36-1-PBTC-50-pd517453498.html | BAYHIBIT AM - Product and calculated active-substance data: https://www.ataman-chemicals.com/en/products/bayhibit-am-2796.html
Abbreviations	CAS: Chemical Abstracts Service; ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road; IMDG: International Maritime Dangerous Goods; IATA: International Air Transport Association; SDS: Safety Data Sheet.
Disclaimer	The information in this SDS applies to the specified product and is provided in good faith based on information available to Richest Group at the date of issue. It describes health, safety and environmental requirements and does not constitute a guarantee of product properties. Users must assess suitability and comply with applicable regulations.