Aquatrade Water Treatment Chemicals (Pty) Ltd

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1 Identification

GHS Product Identifier

PBTC

Other means of identification

CAS:	37971-36-1
EC:	253-733-5
RTECS:	Mixture not listed in registry
ICSC:	Mixture not listed in registry
Chemical Name:	2-PHOSPHONOBUTANE-1,2,4-TRICARBOXYLIC ACID
Chemical Family:	Organophosphates
Synonyms:	PBTCA Phosphonobutane Tricarboxylic Acid
Proper Shipping Name:	CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S.
Chemical Formula:	$C_7H_{11}O_9P$ in H_2O

Recommended use of the chemical and restriction on use

Used as a scale inhibitor, deflocculant, sequestrant, and water stabilizer in cooling water systems.

Supplier's details

AQUATRADE WATER TREATMENT CHEMICALS (PTY) LTD

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2 Hazard(s) identification

Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

Corrosive to Metals (Category 1), H290
Acute Toxicity - Oral (Category 5), H303
Acute Toxicity - Inhalation (Category 4), H332
Skin Corrosion/Skin Irritation (Category 2), H315
Serious Eye Damage/Irritation (Category 1), H318

For the full text of the H-Statements mentioned in this Section, see Section 16.

GHS label elements

Danger


May be corrosive to metals

May be harmful if swallowed

Causes skin irritation

Causes serious eye damage

Harmful if inhaled

Keep only in original container.

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

Wash thoroughly after handling.

Use only outdoors or in a well-ventilated area.

Wear protective gloves/protective clothing/eye protection/face protection.

IF ON SKIN: Wash with plenty of soap and water.

IF INHALED: Remove victim to fresh air and Keep at rest in a position comfortable for breathing.

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

Immediately call a POISON CENTER or doctor/physician.

Specific treatment (see P351+P352 on this label).

If skin irritation occurs: Get medical advice/attention.

Take off contaminated clothing and wash it before reuse.

Absorb spillage to prevent material damage.

Store in corrosive resistant container with a resistant inner liner.

Dispose of contents and container in accordance with local, regional, national, international regulations.

Other hazards which do not result in classification

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

3 Composition/information on ingredients

Description	CAS Number	EINECS Number	%	Note
2-Phosphonobutane-1,2,4,-tricarboxylic acid	37971-36-1		48 - 52	

4 First-aid measures

Description of necessary first-aid measures

Inhalation

Call a physician immediately. Provide / bring into fresh air.

Oral uptake

Call physician immediately. If breathing is irregular or stops provide artificial respiration by examined emergency personnel. Mouth-to-mouth resuscitation could be dangerous to the person applying first aid. In case of unconsciousness, provide recovery position and seek medical advice. Airways have to be kept open. Clothing that is closely to the body (e.g. collar, cravat, waistbelt or -band) have to be loosened.

If swallowed

Call physician immediately. Give water to flush the mouth. Remove person to fresh air. If substance is swallowed and person at consciousness, provide small amounts of water to drink If feeling unwell (vomiting can be harmful), stop drinking. **DO NOT** induce vomiting except on advice of medical personnel. If vomiting occurs keep head below hips to prevent aspiration of liquid into lungs. Chemical burns have to be treated by a physician immediately. Person that lost consciousness may never be treated via oral application. In case of unconsciousness, provide recovery position and seek medical advice. Airways have to be kept open. Clothing that is closely to the body (e.g. collar, cravat, waistbelt or -band) have to be loosened.

After dermal contact
Call physician immediately. In case of skin contact, wash thoroughly with soap and water. Remove contaminated clothing and shoes. Chemical burns have to be treated by a physician immediately. Always change into clean clothing (washed). Clean shoes thoroughly before using again.

Eye contact
Call physician immediately. Immediately flush eyes with plenty of water, lifting the upper and lower eye lids occasionally. Check if the person is wearing contact lenses. If yes, remove contact lenses. Flush eyes for at least 10 minutes. Chemical burns have to be treated by a physician immediately.

Most important symptoms/effects, acute and delayed

No additional data available.

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

Treat symptomatically.

5 Fire-fighting measures

Suitable extinguishing media

Suitable extinguishing media
Water spray (fog), foam, dry chemicals, carbon dioxide.

Non-Suitable extinguishing media
Not known.

Specific hazards arising from the chemical

Special risk of exposition
In case of fire high pressure can bust containers. Prevent persons to enter the area of fire and evacuate all persons to safer places. No action shall be taken involving any personal risk or without suitable training.

Dangerous combustion products
Possible decomposition products are CO2, phosphorus oxides.

Special protective actions for fire-fighters

Special protection device for firemen and fire fighting units
Protective clothing, breathing apparatus (bottled air supply; equipped with over-pressure) with full face protection / mask.

6 Accidental release measures

Personal precautions, protective equipment and emergency procedures

No action shall be taken involving any personal risk or without suitable training. Prevent unprotected and not needed persons to enter the respective area. **DO NOT** breathe vapour or spray mist. Provide fresh air / good ventilation. Wear appropriate protective equipment and clothing. Spillage may create a slip hazard.

For Small Spill
Safety glasses or chemical splash goggles, chemically resistant gloves, chemically resistant boots, and any appropriate body protection to minimize direct contact to the skin. Wear respiratory protection to avoid inhaling vapors.

For Large Spill
Triple gloves (rubber and nitrile over latex), chemical resistant suit, boots, hard hat, full face mask/an air purifying respirator (NIOSH approved). Self contained breathing apparatus must be worn in situations where fumigant gas generation and low oxygen levels are a consequence of contamination from the leak.

Environmental precautions

The spilled substance is not allowed to be drained to the canalization, waste water, and water sources, also **avoid** contact with soil or any spreading of spilled substance. Contact authorities if the substance contaminated the environment (waste water, surface water, soil, air).

Methods and materials for containment and cleaning up

Release of higher amounts

Repair the leak if possible without of danger. Remove container from the contaminated area. The substance is not allowed to enter the canalization, waters, cellars, closed rooms. Absorb spill with inert material (e.g. sand, vermiculite, kieselguhr) and contain (in adequate container, see storage). Dispose of waste according to the local regulations (by an adequate / authorized company). Spilled material can be neutralized by Sodium Carbonate (Na2CO3), Sodium Bicarbonate (NaHCO3), or Sodium Hydroxide (NaOH). Spoilt adsorbent can be dangerous as the substance as such.

Release of small amounts
Repair the leak if possible without of danger. Remove container from the contaminated area. Dissolve with water, absorb with inert, dry material, and contain (in adequate container, see storage). Dispose of waste by an adequate / authorized company.

7 Handling and storage

Precautions for safe handling

Wear sufficient PPE. Eating, drinking and smoking is not allowed where the substance is produced, used and stored. Wash hand and face before eating, drinking, or smoking. **Avoid** contact with eyes, skin and clothing. **DO NOT** ingest. **DO NOT** breathe vapour and spray mist. Do only use in well-ventilated areas or wear respective PPE (respiratory protection) if the usage of the substance bears a risk to the respiratory system at normal conditions. Keep in original container or an authorized substitute of compatible material. Keep container closed.

Empty containers and residues from production can be dangerous.

Conditions for safe storage, including any incompatibilities

Store according to the local regulations. Keep in original containers. They should be kept at a dry, cool, and well-ventilated place, out of direct sunlight. **DO NOT** store with substances that are incompatible: Metals, akali. Keep away from food, drink and animal feedingstuffs. Keep away from alkali. Keep container tightly closed / sealed. Close container carefully and store up-right to avoid leakage. Use adequate / authorized / safe containers to avoid contamination of the environment.

Container material
Use original containers only.

SANS 10263-0 Warehousing
8.4.3.2 Where flammable or **corrosive** substances are stored, the floor shall slope away from the storage area (primary collection area) to a secondary catch basin or sump of capacity at least 10 % of the total available storage volume of the fire section concerned. The secondary catch basin shall be within the fire section, and shall be such that it can be well ventilated. Care shall be taken in the design of such areas to prevent contamination of the soil or ground water.

9.7.2 Every type of storage area inside a warehouse shall be clearly demarcated, for example separate storage areas for poisons, flammables and **corrosives** shall display the relevant hazard class diamond (see table 1). The dimensions of the hazard class diamonds shall be at least 250 mm x 250 mm.

12.8.5 Storage of flammable liquids of class 3, toxic substances of division 6.1 and **corrosives** of class 8

Nitro-methane class 3, UN No. 1261, shall be separated from substances of class 6.1, and cyanides of division 6.1 shall be separated from acids of class 8. Concentrated acids and bases shall be segregated by at least 1 m. Packaged flammable liquids of class 3, toxic substances of division 6.1 and **corrosives** of class 8 that are of category 3 can be stored in the same area, provided that

a) they are kept above floor level, and
b) liquid dangerous goods of one class are not stored above dangerous goods of another class.

12.8.8.3 Toxic and infectious substances (see class 6 in SANS 10228) can contaminate firefighting water in the event of a fire, therefore:

a) Toxic and infectious substances shall be separated from other flammable products and aerosols.
b) Toxic and infectious substances shall be segregated from oxidizing substances, organic peroxides and **corrosives**.
c) Flammable toxic and infectious substances shall be segregated from non-flammable toxic and infectious substances.

12.8.8.4 Corrosives (see class 8 in SANS 10228) that leak or spill from their packaging can cause serious damage to other packages, with potentially hazardous consequences.

Corrosives shall be segregated from toxic substances, infectious substances, aerosols, flammables, oxidizing substances and organic peroxides.

The provisions of above apply to the storage of the following quantities of dangerous goods.

Corrosives (acids and bases) Class 8	
Category 1	> 50 kg
Category 2	> 200 kg
Category 3	> 1 000 kg

8 Exposure controls/personal protection

Control parameters

Substance	CAS No.	OSHA STEL	ACGIH TLV	OSHA PEL	ACGIH STEL
2-Phosphonobutane-1,2,4-tricarboxylic acid	37971-36-1	N/A	N/A	N/A	N/A

Recommended monitoring procedures.
Currently not applicable as no limit value is established. If a limit value will be established, personal, atmospheric or biological monitoring is needed to ascertain the efficacy of exposure limiting measurements.

Limitation and monitoring of exposure at the working place
If necessary, provide technical equipment to meet required limit values.

Limitation and monitoring of environmental exposure
Control emissions of production facility, ventilation systems (to meet the requirements of the environmental legislation). In some cases, cleaners for exhaust air, filters and technical changes are necessary to reduce emissions to reach acceptable values.

Appropriate engineering controls

Avoid spraying the material. Supply safety shower and eyewash in immediate vicinity of exposure area. **Avoid** contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Use appropriate engineering controls to minimize exposure to vapors/dust generated via routine use. Maintain adequate ventilation of workplace and storage areas.

Individual protection measures

The selection of PPE is dependent on a detailed risk assessment. The risk assessment should consider the work situation, the physical form of the chemical, the handling methods, and environmental factors. Recommendations below is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Eye/face protection

Face shield (8-inch minimum) with safety glasses with side shields or safety goggles. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU). Contact lenses should not be worn as they may contribute to severe eye injury.

Hand protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with

applicable laws and good laboratory practices. Wash and dry hands. The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Material: PVC
Break through time: > 60 min

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves.

Body Protection

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hygiene measurements

Wash hand, fore-arms and face before eating, drinking, or smoking, going to the toilet. Clean contaminated clothing in an appropriate way. Always change into clean clothing (washed). Eye wash stations and safety showers have to be available next to the working place.

9 Physical and chemical properties

Physical and chemical properties

Appearance (physical state, colour etc):	Clear pale yellow liquid
Odour:	Slight
Odour threshold:	No test data available
pH (1% Aq. sol.):	< 2
Melting/Freezing Point:	No test data available
Initial boiling point and boiling range:	> 100 °C
Flash point:	Do not flash
Evaporation rate:	No test data available
Flammability (solid, gas):	Not flammable
Upper/lower flammability or explosive limits:	Not explosive
Vapour pressure @ 20 °C:	~20 mmHg
Vapour density:	No test data available
Relative density @ 25 °C:	1.26 - 1.30
Solubility(ies):	Miscible in water
Partition coefficient: n-octanol/water @ 25°C :	-1.36 log P (o/w) Anhydrous
Auto-ignition temperature:	No test data available
Decomposition temperature:	No test data available
Viscosity:	No test data available

NOTE: The physical data presented above are typical values and should not be construed as a specification.

10 Stability and reactivity

Reactivity

Reacts with oxidizing substances, alkalis, nitrites, steel , and sulphites.

Chemical stability

The product is stable under recommended storage and handling conditions.

Possibility of hazardous reactions

Polymerization will not occur. Metal corrosive (highly flammable and explosive hydrogen may be generated).

Conditions to avoid

Avoid exposure to extreme temperatures, incompatible materials, & combustible materials.

Incompatible materials

Corrodes base metals. Reacts with oxidizing substances, alkalis, nitrites, steel , and sulphites.

Hazardous decomposition products

Decomposition: > 100°C. Gives off hydrogen by reaction with metals. Oxides of carbon and oxides of phosphorous formed under decomposition/fire.

11 Toxicological information

Toxicological (health) effects

Acute Toxicity

PBTC was tested for acute oral toxicity in 10 male rats. A single dosage of 5 mL/kg bw (equivalent to about >6500 mg/kg bw) of test substance was administrated by gavage to 10 rats. During 14 days of observation, no mortality and no toxication symptoms were observed. The LD50 was therefore >5 mL/kg bw equivalent >6500 mg/kg bw (Löser, 1979). Due to the high dosage given in the study which resulted with no clinical effects and for animal welfare reasons, there seems to be no need in repeating the test of 1979.

The study result and conclusion is supported by an acute toxicity study performed with PBTC-Tetra-sodium salt in 5 male and 5 female rats (Bomhard, 1990). The test substance was applied one-time by gavage to a final amount of 4000 mg /kg bw. After 14 days of observation no mortality occurred and no toxication symptoms appeared. The LD50 (rat, oral) was therefore estimated as >4000 mg/kg. The development of body weight was not effected in the male rats though a slight reduction in body weight of two male rats was documented. In the pathological examination of all study- rats at the end of the study, it was found that two male and 1 female rats exhibited a brighter (paler) kidney.
In conclusion, the LD50 (oral, rat) of PBTC is >2000 mg/kg bw.

Following the mentioned results, the test substance is not to be classified as acute toxic (oral route).

Acute inhalation toxicity was determined for the test substance, PBTC-tetra-sodium salt as aerosol generated by a dynamic inhalation apparatus. Five male and female rats were exposed for 4 hours to the test substance in analysed concentrations of 800, 1479, 1979 mg/m3 air. After 7 days of observations, no mortality occurred, no clinical symptoms were observed and no significant difference was found in haematological parameters which were examined before and after exposure. The LC50 can be estimated as >1979 mg/m3 (Mihail; Kimmerle, 1976).

In conclusion, the LC50 (inhalation, rat) of PBTC, applied as aerosol/mist (liquid droplets of a substance suspended in air) is >1979 mg/m3 (>1.979 mg/L). Following the mentioned results, the test substance is not to be classified as harmful via inhalation as at the highest achievable concentration (1979 mg/m3) no clinical symptoms were observed and no significant difference was found in haematological parameters which were examined before and after exposure.

A limit test at a dose level of 4000 mg/kg of the test substance "PBTC-tetra-sodium salt" was examined for acute dermal toxicity. 5 male rats and 5 female rats were observed for 14 days after dermal application of the test substance. No mortality occurred during the study time. The LD50 was therefore evaluated as >4000 mg/kg bw. No systemic clinical symptoms or local skin changes were observed. Minor changes were observed in body weight of female rats and no influence was observed in the growing development of the male rats. In a pathological examination of the rats at the end of the study, it was found that one male rat had a brighter (paler) liver with stains and another male rat had in addition a brighter kidney, two female rats, had also a brighter liver (Bomhard, 1990).
In conclusion, the LD50 (dermal, rat) of PBTC is >2000 mg/kg bw.

Following the mentioned results, the test substance is not to be classified as acute toxic (dermal route).

Based on the results of the acute oral toxicity studies, the test substance PBTC is not classified for acute toxic effects according to the CLP/ GHS.

Acute Toxicity: oral
PBTC was tested for acute oral toxicity in 10 male rats. A single dosage of 5 mL/kg bw (equivalent to about > 6500 mg/kg bw) of test substance was administrated by gavage to 10 rats. During 14 days of observation, no mortality and no toxication symptoms were observed. The LD50 was therefore estimated to be > 6500 mg/kg bw (5 mL/kg bw). Due to the high dosage given in the study which resulted with no clinical effects and for animal welfare reasons, there seem to be no need in repeating the test of 1979.

Acute Toxicity: inhalation
Acute inhalation toxicity was determined for the test substance, PBTC-tetra-sodium salt. Five male and female rats were exposed for 4 hours to the test substance in analysed concentrations of 800, 1479, 1979 mg/m3 air. After 7 days of observations, no mortality occurred, no clinical symptoms were observed and no significant difference was found in haematological parameters which were examined before and after exposure.

The LC50 can be estimated as >1979 mg/m3. 1979 mg/m3 was the highest concentration that could technically be achieved. Following the mentioned results, the test substance is not to be classified as harmful via inhalation as at the highest achievable concentration (1979 mg/m3) no clinical symptoms were observed and no significant difference was found in haematological parameters which were examined before and after exposure.

Acute Toxicity: dermal
A limit test at a dose level of 4000 mg/kg of the test substance- PBTC-tetra-sodium salt was examined for acute dermal toxicity. 5 male rats and 5 female rats were observed for 14 days after dermal application of the test substance. No mortality occurred during the study time. The LD50 was therefore evaluated as >4000mg/kg bw. No systemic clinical symptoms or local skin changes were observed. Minor changes were observed in body weight of female rats and no influence was observed in the growing development of the male rats. In a pathological examination of the study- rats at the end of the study, it was found that one male rat had a brighter (paler) liver with stains and another male rat had in addition a brighter kidney, two female rats, had also a brighter liver. Following the mentioned results, the test substance is not to be classified as an acute toxic substance.

Acute Toxicity: other routes
No additional data.

Irritation / corrosion
PBTC was tested as a ca. 50 % solution water in vivo and as a water-free substance in vitro.
The water-free substance was found to be not irritating or corrosive in vitro experiments with 3D-skin.
The water-free substance was found to be irritating in the Human Corneal Epithelial Model (HCE) but slightly irritating in the Hen's Egg Chorioallantoic Membrane (HET-CAM) test.

Skin and eye irritation tests with the 50% aqueous gave negative results.

Skin:
The water-free substance (PBTC wasserfrei) was found to be not irritating or corrosive in vitro experiments with 3D-skin.

Skin irritation tests with the 50% aqueous gave negative results.
Eye:
The water-free substance (PBTC wasserfrei) was found to be irritating in the Human Corneal Epithelial Model (HCE) and slightly irritating in the Hen's Egg Chorioallantoic Membrane (HET-CAM) test.

Eye irritation tests with the 50% aqueous gave negative results.

Sensitisation
Based on the results of the Guinea Pig Maximisation Test (GPMT) according to Magnusson and Kligman with PBTC-tetra-sodium salt

- no skin reaction was observed in the treated group after the challenge test compared to the controls,
- no difference was exhibited between the treated and the control groups concerning body weight development, clinical symptoms PBTC is classified as not sensitizing according to EU Directive 67/548/EC and according to EU regulation No. 1272/2008 (GHS; amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006).

Repeated dose toxicity
Based on the (worst case) NOAEL of 424 mg/kg bw/day (which is > 100 mg/kg bw/day and therefore exceeds the respective guidance value for classification), PBTC is not classified as according to EU Directive 67/548/EC and according to EU regulation No. 1272/2008 (GHS; amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006) as a substance that has produced significant toxicity in humans or that, on the basis of evidence from studies in experimental animals, can be presumed to have the potential to produce significant toxicity in humans following repeated exposure (GHS category 1) or a substance that, on the basis of evidence from studies in experimental animals can be presumed to have the potential to be harmful to human health following repeated exposure (GHS category 2).

Genetic toxicity
Based on the available data derived from four in-vitro tests, that all coincide in the final conclusion that the test substance is not mutagenic, PBTC is not to be classified as mutagen according to EU Directive 67/548/EC and according to EU regulation No. 1272/2008 (GHS; amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006).

Carcinogenicity
No additional data available.

Toxicity to reproduction
Based on the low toxicity profile and the available data on reproduction, there is sufficient data available to conclude 2-phosphonobutane-1,2,4-tricarboxylic acid is not a reproduction toxicant. Thus, according to EU Directive 67/548/EC and according to EU regulation No. 1272/2008 (GHS; amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006) 2-phosphonobutane-1,2,4-tricarboxylic acid should not be classified.

Information on the likely routes of exposure

Workers - Hazard via inhalation route
Systemic effects
Long term exposure

Hazard assessment conclusion:	DNEL (Derived No Effect Level)
Value:	15 mg/m³
Most sensitive endpoint:	repeated dose toxicity
DNEL related information	
Overall assessment factor (AF):	25
Modified dose descriptor starting point:	NOAEC

Acute/short term exposure

Hazard assessment conclusion:	DNEL (Derived No Effect Level)
Value:	158 mg/m³
Most sensitive endpoint:	acute toxicity
DNEL related information	
Overall assessment factor (AF):	13
Modified dose descriptor starting point:	NOAEC

Local effects
Long term exposure

Hazard assessment conclusion:	no-threshold effect and/or no dose-response information available
Acute/short term exposure	
Hazard assessment conclusion:	no-threshold effect and/or no dose-response information available
DNEL related information	-

Workers - Hazard via dermal route
Systemic effects
Long term exposure

Hazard assessment conclusion:	DNEL (Derived No Effect Level)
Value:	4.2 mg/kg bw/day
Most sensitive endpoint:	repeated dose toxicity
DNEL related information	
Overall assessment factor (AF):	100

Modified dose descriptor starting point: NOAEL

Acute/short term exposure
Hazard assessment conclusion: DNEL (Derived No Effect Level)
Value: 80 mg/kg bw/day
Most sensitive endpoint: acute toxicity
DNEL related information
Overall assessment factor (AF): 50
Modified dose descriptor starting point: NOAEL

Local effects
Long term exposure
Hazard assessment conclusion: no-threshold effect and/or no dose-response information available
Acute/short term exposure
Hazard assessment conclusion: no-threshold effect and/or no dose-response information available

Additional information - workers
Systemic DNEL values for short term (acute) and long term exposure as cited above are based on the following calculations:

Derivation of DNELacute, dermal
The DNELacute, dermal was derived from the NOELacute, dermal of 4000 mg/kg bw, determined in an acute toxicity study with rats (EU-Method B.3, see section 7.2.3). An assessment factor of 4 was applied for interspecies variation (allometric scaling from rat to human), an additional 2.5 for other interspecies differences and a factor of 5 for intraspecies differences (workers).

DNELacute, dermal = 80 mg/kg bw.

Derivation of DNELacute, inhalation
An acute inhalation LC50acute, inhalation of 1973 mg/m3 was determined in a study equivalent or similar to OECD 403 (Acute Inhalation Toxicity, see section 7.2.2). For DNEL calculation an assessment factor of 2.5 for was applied for other interspecies differences and a factor of 5 for intraspecies differences (workers).

DNELacute, inhalation = 158 mg/m3.

Derivation of DNELlong-term, dermal
The NOELlong-term, dermal was 424 mg/kg bw/day, calculated from the NOELlong-term, oral= 424 mg/kg bw/day (see section 7.5.1) , assuming 100 % resorption through the skin. An assessment factor of 2 was applied for extrapolation from subacute to chronic exposure, of 4 for allometric scaling from rat to humans plus an additional factor of 2.5 for other interspecies differences and a factor of 5 for intraspecies differences (workers).

DNELlong-term, dermal = 4.2 mg/kg bw/day.

Derivation of DNELlong-term, inhalation
The DNELlong-term, inhalation was derived from the calculated NOEC long-term, oral of 424 mg/kg bw/day (see section 7.5.1). An assessment factor of 2 was applied for extrapolation from subacute to chronic exposure, a factor of 2.5 for other interspecies differences and a factor of 5 for the intraspecies differences (workers).

DNELlong-term, inhalation = 15.

The following DN(M)EL(s) for local effects could not be derived because no threshold value for irritation can be defined.
- Dermal DN(M)EL for acute / short-term exposure - local effects
- Inhalation DN(M)EL for acute / short-term exposure - local effects
- Dermal DN(M)EL for long-term exposure - local effects
- Inhalation DN(M)EL for long-term exposure - local effects

PBTC should be located into the low-hazard band according to “Guidance on information requirements and chemical safety assessment Part E: Risk Characterisation” based on the classification with R36.

General Population - Hazard via inhalation route
Systemic effects
Long term exposure
Hazard assessment conclusion: DNEL (Derived No Effect Level)
Value: 3.7 mg/m³
Most sensitive endpoint: repeated dose toxicity
DNEL related information
Overall assessment factor (AF): 50

Acute/short term exposure
Hazard assessment conclusion: DNEL (Derived No Effect Level)
Value: 79 mg/m³
Most sensitive endpoint: acute toxicity
DNEL related information
Overall assessment factor (AF): 25
Modified dose descriptor starting point: NOAEC

Local effects
Long term exposure
Hazard assessment conclusion: no-threshold effect and/or no dose-response information available
Acute/short term exposure
Hazard assessment conclusion: no-threshold effect and/or no dose-response information available
DNEL related information -

General Population - Hazard via dermal route
Systemic effects
Long term exposure
Hazard assessment conclusion: DNEL (Derived No Effect Level)
Value: 2.1 mg/kg bw/day
Most sensitive endpoint: repeated dose toxicity
DNEL related information
Overall assessment factor (AF): 200
Modified dose descriptor starting point: NOAEL

Acute/short term exposure
Hazard assessment conclusion: DNEL (Derived No Effect Level)
Value: 40 mg/kg bw/day
Most sensitive endpoint: acute toxicity
DNEL related information
Overall assessment factor (AF): 100
Modified dose descriptor starting point: NOAEL

Local effects
Long term exposure
Hazard assessment conclusion: no-threshold effect and/or no dose-response information available
Acute/short term exposure
Hazard assessment conclusion: no-threshold effect and/or no dose-response information available

General Population - Hazard via oral route
Systemic effects
Long term exposure
Hazard assessment conclusion: DNEL (Derived No Effect Level)
Value: 2.1 mg/kg bw/day
Most sensitive endpoint: repeated dose toxicity
DNEL related information
Overall assessment factor (AF): 200
Modified dose descriptor starting point: NOAEL

Acute/short term exposure

Hazard assessment conclusion:	DNEL (Derived No Effect Level)
Value:	65 mg/kg bw/day
Most sensitive endpoint:	acute toxicity

DNEL related information

Overall assessment factor (AF):	100
Modified dose descriptor starting point:	NOAEL

Additional information - General Population

Only systemic effects were considered, as no relevant local effects were observed in any of the available studies. DNEL values for short term (acute) and long term exposure as cited above are based on the following calculations:

Derivation of DNELacute, oral

The DNELacute, oral was derived from the LD50acute, oral of greater 6500 mg/kg bw determined in an acute toxicity study with rats (EU-Method B.1tris, see section 7.2.1). An assessment factor of 4 was applied for the interspecies variation (allometric scaling from rat to human), an additional 2.5 for other interspecies differences and a factor of 10 for intraspecies differences (general population).

DNELacute, oral = 65 mg/kg bw.

Derivation of DNELacute, dermal

The DNELacute, dermal was derived from the calculated NOELacute, dermal of 4000 mg/kg bw, determined in an acute toxicity study with rats (EU-Method B.3, see section 7.2.3). An assessment factor of 4 was applied for interspecies variation (allometric scaling from rat to human), an additional 2.5 for other interspecies differences and a factor of 10 for intraspecies differences (general population).

DNELacute, dermal = 40 mg/kg bw.

Derivation of DNELacute, inhalation

An acute inhalation NOAECacute, inhalation of 184 mg/m3 was calculated from the NOELsubacute, oral (see section 7.2.2). An assessment factor of 2.5 was applied for other interspecies variations and a factor of 10 was for intraspecies differences (general population).

DNELacute, inhalation= 79 mg/m3.

Derivation of DNELlong-term, oral

The NOELlong-term, oral was 424 mg/kg bw/day (EU-Method B.7, see section 7.5.1). An assessment factor of 2 was applied for extrapolation from sub-chronic to chronic exposure, of 4 for allometric scaling from rat to humans plus an additional factor of 2.5 for other interspecies differences and a factor of 10 for the intraspecies differences (general population).

DNELlong-term, oral = 2.1 mg/kg bw/day.

Derivation of DNELlong-term, dermal

The NOELlong-term, dermal was calculated from the NOELlong-term, dermal, assuming 100 % resorption through the skin, resulting in 424 mg/kg bw/day (see Chemical Safety Report). An assessment factor of 2 was applied for extrapolation from subacute to chronic exposure, of 4 for allometric scaling from rat to humans plus an additional factor of 2.5 for other interspecies differences and a factor of 10 for the intraspecies differences (general population).

DNELlong-term, dermal = 2.1 mg/kg bw/day.

Derivation of DNELlong-term, inhalation

The DNELlong-term, inhalation was derived from the calculated NOEClong-term, oral of 424 mg/kg bw/day (see Chemical Safety Report). An assessment factor of 2 was applied for extrapolation from subacute to chronic exposure, an additional factor 2.5 for other interspecies differences and a factor of 10 for intraspecies differences (general population).

DNELlong-term, inhalation = 3.7 mg/m3.

The following DN(M)EL(s) for local effects could not be derived because no threshold value for irritation can be defined.

- Dermal DN(M)EL for acute / short-term exposure - local effects

- Inhalation DN(M)EL for acute / short-term exposure - local effects
- Dermal DN(M)EL for long-term exposure - local effects
- Inhalation DN(M)EL for long-term exposure - local effects

PBTC should be located into the low-hazard band according to “Guidance on information requirements and chemical safety assessment Part E: Risk Characterisation” based on the classification with R36.

Symptoms related to the physical, chemical and toxicological characteristics

Refer section 11.1 "Toxicological (health) effects" above.

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

Refer section 11.1 "Toxicological (health) effects" above.

Numerical measures of toxicity (such as acute toxicity estimates)

Acute toxicity		Category
LD_{50} Oral Rats	> 5 000 mg/kg bw	Not classifiable
LD_{50} Dermal Rats	4 000 mg/kg bw	5
LC_{50} Inhalation Rats	1 979 mg/m^3	4

Interactive effects

No additional data.

Where specific chemical data are not available

No additional data.

Mixtures

No additional data.

Mixture versus ingredient information

No additional data.

Other information

No additional data.

12 Ecological information

Toxicity

Hazard for aquatic organisms

Freshwater

Hazard assessment conclusion:	PNEC aqua (freshwater)
PNEC value:	3.33 mg/L
Assessment factor:	10
Extrapolation method:	assessment factor
PNEC freshwater (intermittent releases):	10.42 mg/L

Marine water

Hazard assessment conclusion:	PNEC aqua (marine water)
PNEC value:	0.33 mg/L
Assessment factor:	100
Extrapolation method:	assessment factor

STP

Hazard assessment conclusion:	PNEC STP
PNEC value:	50.4 mg/L
Assessment factor:	10

Extrapolation method: assessment factor

Sediment (freshwater)
Hazard assessment conclusion: PNEC sediment (freshwater)
PNEC value: 1.47 mg/kg sediment dw
Extrapolation method: equilibrium partitioning method

Hazard for terrestrial organisms
Soil
Hazard assessment conclusion: PNEC soil
PNEC value: 0.491 mg/kg soil dw
Assessment factor: 1 000
Extrapolation method: assessment factor

Hazard for predators
Secondary poisoning
Hazard assessment conclusion: PNEC oral
PNEC value: 0.09 g/kg food
Assessment factor: 90

Additional information
The PNEC´s were derived from the most sensitive study available for each compartment.

For calculation of the PNECwater the EC10 of 33.3 mg/L value of the Algal Growth Inhibition Test was used to reflect a worst case scenario. As three long term studies from three trophic levels were available, an assessment factor of 10 was applied (Guidance On Information Requirements And Chemical Safety Assessment, May 2008). Therefore, the PNEC for aquatic organisms is 3.33 mg/L.

PNECaquatic freshwater = lowest long term result/10 = 3.33 mg/L

For the calculation of the PNECaquatic-marine the lowest freshwater result, of the three long term studies from three trophic levels was used with an assessment factor of 100 (Guidance On Information Requirements And Chemical Safety Assessment, May 2008).

PNECaqua-marine = lowest long term result/100 = 0.33 mg/L

For the calculation of the PNECaqua-intermitted releases the most sensitive short term result was used and an assessment factor of 100 was applied. The short term toxicity test to fish revealed the most sensitive EC50 value of > 1042 mg/L.

PNECaqua-intermitted releases = lowest short term result/100 = 10.42 mg/L

Conclusion on classification
Based on the aquatic and terrestrial toxicity data obtained, that all coincide in the final conclusion that the test substance is of no immediate concern for the environment, BAYHIBIT AM is not classified according to EU Directive 67/548/EC and according to EU regulation No. 1272/2008 (GHS; amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006).

Short-term toxicity to fish
A LC50(96h) of > 1042 mg/L was concluded from the results of the available prolonged toxicity study in fish (species: zebra danio) over 14 days. Thus, the LC50(96h) is higher than the concentration of the limit test (100 mg/L). No further testing (in respect of classification and labelling etc.) is required.

Long-term toxicity to fish
A NOEC of >= 1042 mg/L was found in a prolonged toxicity study over 14 days in Brachydanio rerio.

Short-term toxicity to aquatic invertebrates
A prolonged toxicity study in Daphnia magna was performed over 21 days and the effect on mobility was determined: EC 50 (immobilisation, 21d): >1071 mg/L. Based on this result, an EC (24h) and a EC50 (48h) value was concluded of >1071 mg/L each. As these EC50 values are higher than the concentration of the limit test (100 mg/L), no further testing (in

respect of classification and labelling etc.) is required.

Long-term toxicity to aquatic invertebrates
A prolonged toxicity study in Daphnia magna was performed over 21 days.
The respective effects on reproduction (NOEC, LOEC, EC50) and mobility were determined (EC50):

- EC 50 (immobilisation, 21d): > 1071 mg/L
- EC 50 (reproduction, 21d): > 329 - < 1071 mg/L
- NOEC (reproduction, 21d): 104 mg/L
- LOEC (reproduction, 21d): 329 mg/L

Toxicity to aquatic algae and cyanobacteria
The results found in the growth inhibition test of PBTC in algae are EC50 (biomass) > 140 mg/L and EC50 (growth rate) > 1081 mg/L. As this values are higher than 100 mg/L, no ecotoxicological hazard is indicated for algae (respective aquatic environment) even it is the most sensitive species (compared to daphnia and fish).

Toxicity to microorganisms
A study was performed to assess the toxicity of PBTC to microorganisms. The study was conducted in accordance with Council Regulation (EC) No 440/2008, Method C.11 "Activated sludge respiration inhibition" (2008). This test method is equal to OECD Guideline 209 (1984). The activated sludge was exposed to a 50.4% water solution of PBTC at different concentrations. The respiration rate of each mixture was determined after aeration periods of 3 hours. PBTC showed 4.3 % respiration inhibition of activated sludge at a test item concentration of 1000 mg/L. The EC50 is higher than 1000 mg/L. The effect value related to nominal concentration, since no analytical monitoring was performed.

Toxicity to soil macroorganisms except arthropods
Different concentrations (1 -1000 mg) of PBTC, thoroughly mixed in artificial soil, were tested for toxicity of earthworms. After 14 days of exposure to the test material, no significant difference was observed in mortality rate and in weight in any of the different concentration groups that were examined compare to the control group. In addition, abnormalities, like changes in behaviour were also not observed in the study. Thereby, the LC50 (14 days) was determined for PBTC as > 1000 mg/kg dry weight substrate. In relation to weight alteration and symptoms, the no-observed-effect concentration (NOEC) was 1000 mg/kg dry weight substrate, the lowest-observed-effect concentration (LOEC) and the lowest tested concentration with mortality (LLC) was > 1000 mg/kg dry weight substrate.

Persistence and degradability

Biodegradation in water
2-phosphonobutane-1,2,4-tricarboxylic acid was examined for biodegradability according to the "Modified OECD-Screening-Test" (Guideline 301 E) and according to the "Modified SCAS-Test as described in OECD Guideline 302 A. In both tests, no (inherent) biodegradation was observed under test conditions (Horstmann, Grohmann, 1988). Also no biodegradation was observed in the "Closed Bottle Test" according to OECD Guideline 301 D (Kästner, Gode, 1983). In another test 2-phosphonobutane-1,2,4-tricarboxylic acid tetra sodium salt was examined for inherent biodegradability according to the " Zahn-Wellens test". Again, no biodegradation was observed (BUA, 1994).

Thus, PBTC is not ready biodegradable in water.

Biodegradation in water and sediment
Opposed to OECD guideline 308, not a water-sediment system but the inocula gained from river water and river sediment were separately tested for their ability to degrade PBTC. PCBT as sole source of carbon, both with PBTC and orthophosphate as sources of phosphorus, was found to be not biodegradable by enrichment cultures from river water and river sediment. Biodegradability was found either by certain strains gained from these cultures or if an alternative source of carbon is available. In the latter case degradation was observed, even if in the presence if inorganic phosphate. Both (alternative carbon source, inorganic phosphate) are present in many environmental surface water. Thus, PBTC is biodegradable under environmental conditions equivalent / similar to the test conditions. The biodegradation was shown to be more effective and faster if a certain strain or strain combination gained from this both ecosystems was used. Slow degradation under anaerobic conditions for cultures from rivers sediment and river water is not clearly stated by the publication but can be strongly be assumed based on the presented information. Abiotic degradation was not observed.

The study has shown that biodegradation of PBTC in river water and river sediment under environmental conditions primarily depends on the presence of an alternative carbon source and could be optimized certain strains that can easily be enriched and isolated from these both compartments (Rasche et al., 1994).

Biodegradation in soil
The degradability of [3,4-14C]PBTC, 2-phosphonobutane-1,2,4-tricarboxylic acid, was investigated in three agricultural soils. The test soils maintained under aerobic conditions were German standard soils 1.) BBA 2.1 (sand), 2.) BBA 2.2 (loamy sand), 3.) silt loam from Bayer farm Laacherhof. Start concentration was 0.92 µg PBTC/100 g DW of soil (0.92 ppm). Temperature and soil moisture during total testing period of 133 days were 20°C and about 50% of the respective maximum water holding capacity. The recoveries (material balances) for the different test vessels ranged from 101.7% to 105.6%. The [14C]PBTC was thoroughly metabolised to 14CO2, the main degradation product, accounting for 21.3% , 27.4%, 15.5% of the applied radioactivity in the soils 1.), 2.) and 3.) after 133 days, respectively. During the incubation period a constant increase of 14CO2 was measured. However, the formation rates of 14CO2 decreased with increasing time parallel to the decrease of the active biomass of soils. After 133 days low portions of PBTC were recovered by two extractions using aqueous CaCl2 solution (2.1%, 1.4% and 0.2% for soils BBA 2.1, BBA 2.2 and Laacherhof, respectively) indicating a correlation to the textural class of soil. The main portion of radioactivity (pre-dominantly as PBTC) was extracted by extensive HCl extraction. The portion of not-extracted (bound) residue resulting from the [14C]PBTC treatment amounted to 16.8%, 31.8% and 42.1% for the soils BBA 2.1, BBA 2.2 and Laacherhof, respectively. Correlation to the textural class of soil (lowest bound residues in the sand, highest in the silt loam) was observed. The predominant portion of radioactivity as well as of PBTC remaining in soil after 133 days of incubation was not easy to extract indicating a low mobility or leaching potential of PBTC in soils. The time for disappearance of 50% of PBTC (DT50 value) calculated (1st order) from the results of HPLC (on realistic worst case assumption for peak evaluation) was 142 days, 102 days and 107 days for the soils BBA 2.1, BBA 2.2 and Laacherhof, respectively. Due to known limitations of laboratory test systems (not all the processes relevant for degradation under outdoor conditions are reflected) the degradation rates reported here do not necessarily reflect the real situation in a natural environment.

Nevertheless, it was shown that the PBTC is moderately degradable and is thoroughly metabolised to CO2 in soil (Hellpointner, 1996).

Bioaccumulative potential

A substance is assessed as potentially bioaccumulative, if its log Pow is higher than 3. The log Pow of 2-phosphonobutane-1,2,4-tricarboxylic acid was calculated to be -1.36 at 25°C. Therefore, PBTC is considered as not potentially bioaccumulative.

Mobility in soil

According to REGULATION (EC) No 1907/2006 (ANNEX VIII) a study or screening test on adsorption / desorption has not to be conducted if based on the physicochemical properties the substance can be expected to have a low potential for adsorption (e.g. the substance has a low octanol water partition coefficient).

The log Pow of 2-phosphonobutane-1,2,4-tricarboxylic acid was calculated to be -1.36 at 25°C.

Therefore, PBTC is expected to have a low potential for adsorption.

Other adverse effects

No additional data.

13 Disposal considerations

Disposal methods

Waste disposal recommendations:
Dispose of waste and container in accordance with local and/or national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals. Recycle/reuse. Remove for physico-chemical/biological treatment. **DO NOT** discharge into drains or the environment.

Ecology - waste materials:
DO NOT release to the environment.

Empty Container:
DO NOT reuse container. Rinse/Decontaminate thoroughly before discarding in trash or return to supplier.

14 Transport information

UN Number

TRANSPORTATION CLASSIFICATION	ADR/RID	ADN(R)	IMDG	ICAO/IATA
Identification Number	3265	3265	3265	3265
Proper Shipping Name	CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S.	CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S.	CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S.	CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S.
Transport Hazard Class(es)	8 	8 	8 	8 
Packing Group	III	III	III	III
Marine Pollutant	No	No	No	No
Emergency Response	**ERG**: 153	-	**EMS**: F-A S-B	-
Exempt Quantity Quantity Limits	**Exempt** 200Kg/L F: 5	**Quantity Limits** Passenger 5L	-	**Quantity Limits** Passenger 5L Cargo 60L
Stowage Category	-	**10A**: A **10B**: 40	**10A**: A **10B**: 40	**10A**: A **10B**: 40

UN Proper Shipping Name

Refer table above in section 14.1 "UN Number".

Transport hazard class(es)

Refer table above in section 14.1 "UN Number"

Packing group, if applicable

Refer table above in section 14.1 "UN Number".

Environmental hazards

Refer table above in section 14.1 "UN Number".

Special precautions for user

DO NOT load with Class 1 and 2.3.
May be loaded with Class 2.1, 2.2, 5.1, 6.1, 6.2 and 8B if kept at least 1 metre apart.
Can be loaded with all other classes.
Goods of different classes **must** be segregated by an air space of at least 100mm or by an approved segregation device or non-dangerous goods.

P, B, L and O provisions as per SANS 10231:2018
None

GUIDE 154: SUBSTANCES - TOXIC AND/OR CORROSIVE (NON-COMBUSTIBLE)
Public Safety

- CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.
- Keep unauthorized personnel away.
- Stay upwind, uphill and/or upstream.
- Ventilate enclosed areas.

Protective Clothing

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

Evacuation

Spill

- See Table 1 - Initial Isolation and Protective Action Distances for highlighted materials. For non-highlighted materials, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY".

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.
- [FLAG] In Canada, an Emergency Response Assistance Plan (ERAP) may be required for this product. Please consult the shipping document and/or the ERAP Program Section (page 391).

Fire

Small fires

- Dry chemical, CO2 or water spray.

Large fires

- Dry chemical, CO2, alcohol-resistant foam or water spray.
- Move containers from fire area if you can do it without risk.
- Dike fire control water for later disposal; do not scatter the material.

Fire involving tanks or car/trailer loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- **DO NOT** get water inside containers.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

Spill or Leak

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- **DO NOT** touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- **DO NOT** GET WATER INSIDE CONTAINERS.

First Aid

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
- Move victim to fresh air.
- Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- **DO NOT** use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- For minor skin contact, avoid spreading material on unaffected skin.
- Keep victim calm and warm.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable.

15 Regulatory information

Safety, health and environmental regulations specific for the product in question

SA NATIONAL LEGISLATION

Hazardous Substances Act 15 of 1973 and Regulations.
Occupational Health and Safety Act 85 of 1993 and Regulations.

SA NATIONAL STANDARDS

SANS 10228 : 2006 : Identification and Classification of Dangerous Goods for Transport by Road and Rail.
SANS 10231 : 2018 : Transport of dangerous goods - Operational requirements for road vehicles.
SANS 10234 : 2008 : Globally Harmonized System of classification and labelling of chemicals (GHS).
SANS 11014 : 2010 : Safety Data Sheets for chemical Products.

REACH Regulation (EC) No 1907/2006

This product contains only components that have been either pre-registered, registered, are exempt from registration, are regarded as registered or are not subject to registration according to Regulation (EC) No. 1907/2006 (REACH)., The aforementioned indications of the REACH registration status are provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. It is the buyer´s/user´s responsibility to ensure that his/her understanding of the regulatory status of this product is correct.

Seveso III: Directive 2012/18/EU

Listed in Regulation: Not applicable

U.S. FEDERAL REGULATIONS

TSCA

All components of this product are listed on the TSCA inventory.

CERCLA

No components of this product are listed.

SARA TITLE III (EPCRA) Section 313

No components of this product are listed.

SARA TITLE III (EPCRA) Section 311/312

Acute Health Hazard/10,000 lbs.

US EPA Resource Conservation and Recovery Act (RCRA)

Composite List of Hazardous Wastes and Appendix VIII Hazardous Constituents (40 CFR 261): When discarded in its purchased form, this product meets the criteria of corrosivity, and should be managed as a hazardous waste (EPA Hazardous Waste Number D002). (40 CFR 261.20-24)

California Proposition 65

This product contains chemicals known to the Sate of California to be Carcinogenic. Developmental toxin - Female productive toxin. Male reproductive toxin

Weight %	Components	CAS No.
50 ppb	Cobalt	7440-48-4
20 ppb	Cadmium	7440-43-9
10 ppb	Arsenic	7440-38-2
0.2 ppb	Nickel	7440-02-0
1 ppb	Mercury	7439-97-6
20 ppb	Lead	7439-92-1

OSHA

This product is not considered highly hazardous.

Canadian WHMIS Classification

D2(B) - Materials causing other toxic effects; E - Corrosion Material

Chemical safety assessment

Not assessed.

16 Other information

Other information

Full text of H & P - Statements referred to under section 2

Hazard statements

H290	May be corrosive to metals.
H303	May be harmful if swallowed.
H332	Harmful if inhaled.
H315	Causes skin irritation.
H318	Causes serious eye damage.

Precautionary statements

P234	Keep only in original container.
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.
P302+P352	IF ON SKIN: Wash with plenty of soap and water.
P304+P340	IF INHALED: Remove victim to fresh air and Keep at rest in a position 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.
P310	Immediately call a POISON CENTER or doctor/physician.
P321	Specific treatment (see P351+P352 on this label).
P332+P313	If skin irritation occurs: Get medical advice/attention.
P362+P364	Take off contaminated clothing and wash it before reuse.
P390	Absorb spillage to prevent material damage.
P406	Store in corrosive resistant container with a resistant inner liner.
P501	Dispose of contents and container in accordance with local, regional, national, international regulations.

Labelling REGULATION (EC) No 1272/2008

Signal Word

Danger

Pictograms Hazard to Human

GHS05	Corrosive hazard
GHS07	Health hazard

Pictogram Hazard during Transport

Class 8	Corrosive substance

Training advice

Provide adequate information, instruction and training for operators.

Information sources

1. ECHA - European Chemicals Agency https://echa.europa.eu/de/registration-dossier/-/registered-dossier/14870/1
2. National Center for Biotechnology Information. PubChem Database. CID=61973, https://pubchem.ncbi.nlm.nih.gov/compound/2-Phosphonobutane-1_2_4-tricarboxylic-acid (accessed on June 20, 2019)

Compiled by Aquatrade Water Treatment Chemicals (Pty) Ltd, R. van Rooyen, SHEQ Co-ordinator and E. Le Sar, Director.

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Revision History

Revision	Date	Change
1.0	2019/06/20	Preparation of the safety data sheet according to SANS 11014:2010