

Tetrakis(hydroxymethyl) Phosphonium Sulfate (THPS 75%)

Revision Date 01/31/2023

SECTION 1: Identification of the substance/mixture and of the company/undertaking**1.1 Product identifier Tetrakis(hydroxymethyl) Phosphonium Sulfate**

- Trade name THPS 75%

1.2 Relevant identified uses of the substance or mixture and uses advised against**Uses of the Substance / Mixture**

- Corrosion inhibitors and anti-scaling agents

Uses advised against

- Aerosol

Remarks

- For professional and industrial installation and use only.

1.3 Details of the supplier of the safety data sheet**Distributed By**

Silver Fern Chemical, Inc.
2226 Queen Anne Ave N.
Seattle, WA 98109
Customer Service Ph: 206-282-3376 / info@silverfernchemical.com
www.silverfernchemical.com

1.4 Emergency telephone (24 Hours)

**FOR EMERGENCIES INVOLVING A SPILL, LEAK, FIRE, EXPOSURE OR ACCIDENT, CONTACT
INFO-TRAC +1-800-535-5053; Outside USA & Canada +1-352-323-3500.**

SECTION 2: Hazards identification

Although OSHA has not adopted the environmental portion of the GHS regulations, this document may include information on environmental effects.

2.1 Classification of the substance or mixture**HCS 2012 (29 CFR 1910.1200)**

Acute toxicity, Category 4	H302: Harmful if swallowed.
Acute toxicity, Category 3	H331: Toxic if inhaled.
Serious eye damage, Category 1	H318: Causes serious eye damage.
Skin sensitization, Category 1	H317: May cause an allergic skin reaction.
Reproductive toxicity, Category 2	H361: Suspected of damaging fertility or the unborn child.

2.2 Label elements**HCS 2012 (29 CFR 1910.1200)****Pictogram****Signal Word**

- Danger

Hazard Statements

- H302 Harmful if swallowed.
- H317 May cause an allergic skin reaction.
- H318 Causes serious eye damage.
- H331 Toxic if inhaled.
- H361 Suspected of damaging fertility or the unborn child.

Precautionary StatementsPrevention

- P201 Obtain special instructions before use.
- P202 Do not handle until all safety precautions have been read and understood.
- P261 Avoid breathing mist or vapors.
- P264 Wash skin thoroughly after handling.
- P270 Do not eat, drink or smoke when using this product.
- P271 Use only outdoors or in a well-ventilated area.
- P272 Contaminated work clothing must not be allowed out of the workplace.
- P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response

- P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
- P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
- P304 + P340 + P311 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor.
- P305 + P351 + P338 + P310 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/ doctor.
- P308 + P313 IF exposed or concerned: Get medical advice/ attention.
- P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
- P363 Wash contaminated clothing before reuse.

Storage

- P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
- P405 Store locked up.

Disposal

- P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Other hazards which do not result in classification

- H400: Very toxic to aquatic life.
- H411: Toxic to aquatic life with long lasting effects.

In case of ingestion

- Do not induce vomiting without medical advice.
- Rinse mouth with water.
- Do not give anything to drink.
- Keep at rest.
- Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed**Symptoms**

- Lachrymation

Symptoms

- Ingestion may provoke the following symptoms:
- Nausea
- Liver disorders

Symptoms

- Symptoms of poisoning may not appear for several hours. Keep under medical supervision for at least 48 hours.
- Symptoms will depend on the target organs.

4.3 Indication of any immediate medical attention and special treatment needed**Notes to physician**

- All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

SECTION 5: Firefighting measures**Flash point**

Not applicable, aqueous liquid for which the organic components have flash point > 100 °C / 212°F

Flammability class: Will burn

Autoignition temperature

No data available

Flammability / Explosive limit

No data available

5.1 Extinguishing media**Suitable extinguishing media**

- Extinguishing media - small fires
- Water spray
- Multipurpose powders
- Carbon dioxide (CO₂)
- Alcohol Resistant Aqueous Film Forming Foam (AR-AFFF)

- Extinguishing media - large fires
- Water spray
- Multipurpose powders
- Alcohol Resistant Aqueous Film Forming Foam (AR-AFFF)

Unsuitable extinguishing media

- Do not use a solid water stream as it may scatter and spread fire.

5.2 Special hazards arising from the substance or mixture

Specific hazards during fire fighting

- The pressure in sealed containers can increase under the influence of heat.
- In case of heating:
- Harmful or toxic vapors are released.
- Hazardous decomposition products formed under fire conditions.
- (following evaporation of water)
- High concentrations of toxic or harmful products may remain in the residual liquid once the fire has been extinguished.

Hazardous combustion products:

- Oxides of phosphorus
- Sulfur oxides
- Carbon monoxide, carbon dioxide and unburned hydrocarbons (smoke).
- Phosphorus compounds
- Hydrogen

5.3 Advice for firefighters

Special protective equipment for fire-fighters

- Firefighters should wear NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing.
- Personal protective equipment comprising: suitable protective gloves, safety goggles and protective clothing

Specific fire fighting methods

- Stay upwind.
- Fight fire with normal precautions from a reasonable distance.
- Suppress (knock down) gases/vapors/mists with a water spray jet.
- Do not use a solid water stream as it may scatter and spread fire.
- Cool down the containers / equipment exposed to heat with a water spray. Ensure that there is NO direct contact between the water and the product.
- Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
- Persons who may have been exposed to contaminated smoke should be immediately examined by a physician and checked for symptoms of poisoning. The symptoms should not be mistaken for heat exhaustion or smoke inhalation.

Further information

- Evacuate personnel to safe areas.
- Intervention only by capable personnel who are trained and aware of the hazards of the product.
- Never approach containers which have been exposed to fire, without cooling them sufficiently.
- Collect contaminated fire extinguishing water separately. This must not be discharged into drains.
- Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

- Immediately evacuate personnel to safe areas.
- Stay upwind.
- Only qualified personnel equipped with suitable protective equipment may intervene.
- Avoid inhalation, ingestion and contact with skin and eyes.
- Wear chemical resistant personal protective equipment
- Wear suitable gloves.
- Wear suitable protective clothing.
- Respiratory protection
- Wear as appropriate:
 - Face-shield
 - Tightly fitting safety goggles
- In the case of dust or aerosol formation use respirator with an approved filter.
- In the case of vapor formation use a respirator with an approved filter.
- Stop leak if safe to do so.
- If spillage occurs on the public highway, indicate the danger and notify the authorities (police, fire service).
- For further information refer to section 8 "Exposure controls / personal protection."

6.2 Environmental precautions

- Take all necessary measures to avoid accidental discharge of products into drains and waterways due to the rupture of containers or transfer systems.
- Prevent further leakage or spillage if safe to do so.
- Contain the spilled material by diking.
- The product should not be allowed to enter drains, water courses or the soil.
- Local authorities should be advised if significant spillages cannot be contained.
- If the product contaminates rivers and lakes or drains inform respective authorities.
- If the spill area is porous, the contaminated material must be collected for subsequent treatment or disposal.
- Spills may be reportable to the National Response Center (800-424-8802) and to state and/or local agencies

6.3 Methods and materials for containment and cleaning up

- Stop leak if safe to do so.
- Dam up with sand or inert earth (do not use combustible materials).
- Control the vapors with:
 - Alcohol Resistant Aqueous Film Forming Foam (AR-AFFF)
- Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder).
- Shovel or sweep up.
- Keep in suitable, closed containers for disposal.
- Never return spills in original containers for re-use.
- Wash nonrecoverable remainder with large amounts of water.
- Clean contaminated surface thoroughly.
- Recover the cleaning water for subsequent disposal.
- Decontaminate tools, equipment and personal protective equipment in a segregated area.
- Dispose of as hazardous waste in compliance with local and national regulations.

Additional advice

- Possible need to alert the neighborhood.
- Mark the contaminated area with signs and prevent access to unauthorized personnel.
- Only qualified personnel equipped with suitable protective equipment may intervene.
- Following decontamination, wait several hours before allowing anyone to enter the area.
- Material can create slippery conditions.

6.4 Reference to other sections

- 7. HANDLING AND STORAGE
- 8. EXPOSURE CONTROLS/PERSONAL PROTECTION
- 13. DISPOSAL CONSIDERATIONS

SECTION 7: Handling and storage**7.1 Precautions for safe handling**

- Handle in accordance with good industrial hygiene and safety practice.
- The product must only be handled by specifically trained employees.
- Provide sufficient air exchange and/or exhaust in work rooms.
- Vapor extraction at source
- Do not use in areas without adequate ventilation.
- Do NOT handle in a confined space.
- Extracted air must not be allowed to return to the workplace.
- Wear personal protective equipment.
- Wear suitable protective clothing.
- Avoid inhalation, ingestion and contact with skin and eyes.
- Do NOT handle without gloves.
- Do NOT handle if hands have any cuts or wounds.
- Avoid splashes.
- Avoid formation of aerosol.
- Pregnant or breastfeeding workers should not be occupied in the blending and high temperature processing operations.
- For personal protection see section 8.

Hygiene measures

- Personal hygiene is an important work practice exposure control measure and the following general measures should be taken when working with or handling this materials:
- 1) Do not store, use, and/or consume foods, beverages, tobacco products, or cosmetics in areas where this material is stored.
- 2) Wash hands and face carefully before eating, drinking, using tobacco, applying cosmetics, or using the toilet.
- 3) Wash exposed skin promptly to remove accidental splashes or contact with material.
- The user is responsible for monitoring the working environment in accordance with local laws and regulations.
- Exposed employees should have regular medical check-ups

7.2 Conditions for safe storage, including any incompatibilities**Technical measures/Storage conditions**

- Take all necessary measures to avoid accidental discharge of products into drains and waterways due to the rupture of containers or transfer systems.
- Keep in a contained area
- The floor of the storage area should be impermeable and designed to form a water-tight basin.
- Keep locked up or in an area accessible only to qualified or authorized persons.
- Keep containers tightly closed in a dry, cool and well-ventilated place.
- Keep away from open flames, hot surfaces and sources of ignition.
- Keep away from incompatible materials to be indicated by the manufacturer
- Keep away from: Hazardous reactions may occur on contact with certain chemicals. (Refer to the list of incompatible materials section 10: "Stability-Reactivity").

Packaging material**Suitable material**

- high density
- Polyethylene
- high density
- Polypropylene
- Stainless steel

Requirements for storage rooms and vessels

- No decomposition if stored and applied as directed.

7.3 Specific end use(s)

- Contact your supplier for additional information
- Contact your supplier for additional information

SECTION 8: Exposure controls/personal protection

Introductory Remarks: These recommendations provide general guidance for handling this product. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. Assistance with selection, use and maintenance of worker protection equipment is generally available from equipment manufacturers.

8.1 Control parameters**Components with workplace occupational exposure limits**

Components	Value type	Value	Basis
Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1)	TWA	2 mg/m ³	American Conference of Governmental Industrial Hygienists
Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1)	TWA	0.43 mg/m ³	Solvay Acceptable Exposure Limit

8.2 Exposure controls**Control measures****Engineering measures**

- Where engineering controls are indicated by use conditions or a potential for excessive exposure exists, the following traditional exposure control techniques may be used to effectively minimize employee exposures :
- Effective exhaust ventilation system
- Ensure adequate ventilation.
- Extract at emission point.
- Ensure that extracted air cannot be returned to the workplace through the ventilation system.
- Use mechanical handling to reduce human contact with materials.
- Use closed processing systems or containment technologies.
- Avoid splashes.
- Avoid formation of aerosol.

Individual protection measures**Respiratory protection**

- This should be achieved by a good general extraction and -if practically feasible- by the use of a local exhaust ventilation.
- When respirators are required, select NIOSH/MSHA approved equipment based on actual or potential airborne concentrations and in accordance with the appropriate regulatory standards and/or industrial recommendations.
- If mist is formed:
- Respirator with a particle filter.
- Recommended Filter type: Particulates type

Hand protection

- Where there is a risk of contact with hands, use appropriate gloves
- Gloves must be inspected prior to use.
- Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time.
- Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.

Suitable material

- PVC
- Protective index Class 6
- Break through time: > 480 min

- Glove thickness: 1.23 mm
- Nitrile rubber
- Protective index Class 6
- Break through time: > 480 min
- Glove thickness: 1.23 mm

Eye protection

- Eye and face protection requirements will vary dependent upon work environment conditions and material handling practices. Appropriate ANSI Z87 approved equipment should be selected for the particular use intended for this material.
- Eye contact should be prevented through the use of:
 - Tightly fitting safety goggles
 - Face-shield

Skin and body protection

- Full protective suit
- Footwear protecting against chemicals
- Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures

- Personal hygiene is an important work practice exposure control measure and the following general measures should be taken when working with or handling this materials:
 - 1) Do not store, use, and/or consume foods, beverages, tobacco products, or cosmetics in areas where this material is stored.
 - 2) Wash hands and face carefully before eating, drinking, using tobacco, applying cosmetics, or using the toilet.
 - 3) Wash exposed skin promptly to remove accidental splashes or contact with material.
- The user is responsible for monitoring the working environment in accordance with local laws and regulations.
- Exposed employees should have regular medical check-ups

Protective measures

- Always have on hand a first-aid kit, together with proper instructions.
- Plan first aid action before beginning work with this product.
- Emergency equipment immediately accessible, with instructions for use.
- Ensure that eyewash stations and safety showers are close to the workstation location.
- Selection of appropriate personal protective equipment should be based on an evaluation of the performance characteristics of the protective equipment relative to the task(s) to be performed, conditions present, duration of use, and the potential hazards, and/or risks that may occur during use.
- The protective equipment must be selected in accordance with current local standards and in cooperation with the supplier of the protective equipment.

SECTION 9: Physical and chemical properties

Physical and Chemical properties here represent typical properties of this product. Contact the business area using the Product information phone number in Section 1 for its exact specifications.

9.1 Information on basic physical and chemical properties

Physical state liquid (68 °F (20 °C))

Form Aqueous solution

<u>Color</u>	colorless to pale yellow
<u>Odor</u>	characteristic Do not attempt to smell the product as it is hazardous. Do not attempt to smell the product as it is hazardous.
<u>Odor Threshold</u>	No data available
<u>Melting point/freezing point</u>	<u>Freezing point</u> : < -4 °F (< -20 °C)
<u>Initial boiling point and boiling range</u>	<u>Boiling point/boiling range</u> : 227.3 °F (108.5 °C) (759.81 mmHg (1,013 hPa))
<u>Flammability (solid, gas)</u>	No data available
<u>Flammability (liquids)</u>	No data available
<u>Flammability / Explosive limit</u>	No data available
<u>Flash point</u>	Not applicable, aqueous liquid for which the organic components have flash point > 100 °C / 212°F Flammability class: Will burn
<u>Autoignition temperature</u>	No data available
<u>Decomposition temperature</u>	> 320 °F (160 °C)
<u>pH</u>	3.0 - 6.0 (68 °F (20 °C)) pure product
<u>Viscosity</u>	<u>Viscosity, kinematic</u> : 32 mm ² /s (77 °F (25 °C))
<u>Solubility</u>	<u>Water solubility</u> : completely miscible <u>Solubility in other solvents</u> : Methanol: soluble N-Methylpyrrolidone: soluble Isopropanol: soluble Acetone: insoluble Tetrahydrofuran: insoluble
<u>Partition coefficient: n-octanol/water</u>	log Pow: -9.8 Structure-activity relationship (SAR), estimated
<u>Vapor pressure</u>	< 0.000002 mmHg (< 0.0000026 hPa) (77 °F (25 °C)) Test results are based on the dry product.
<u>Density</u>	1.37 - 1.41 g/cm ³ (68 °F (20 °C))
<u>Relative density</u>	1.39 (68 °F (20 °C))

<u>Relative vapor density</u>	No data available
<u>Particle characteristics</u>	No data available
<u>Evaporation rate (Butylacetate = 1)</u>	No data available

9.2 Other information

<u>Oxidizing properties</u>	Not considered as oxidizing., Structure-activity relationship (SAR)
<u>Non Volatiles by Weight</u>	ca. 75 %

SECTION 10: Stability and reactivity

10.1 Reactivity

- Stable at normal ambient temperature and pressure.

10.2 Chemical stability

- Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

- No dangerous reaction known under conditions of normal use.
- Hazardous polymerization does not occur.
- No decomposition if used as directed.

10.4 Conditions to avoid

- Do not mix undiluted product with concentrates of ammonium bisulphite

10.5 Incompatible materials

- Strong acids and strong bases
- Strong oxidizing agents
- Strong reducing agents.

10.6 Hazardous decomposition products

- Oxides of phosphorus
- Sulfur oxides
- Carbon monoxide, carbon dioxide and unburned hydrocarbons (smoke).
- Phosphine
- Hydrogen

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Acute oral toxicity

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) LD50 : 431 mg/kg - Rat , male and female
 Method: OECD Test Guideline 401
 This product is classified as acute toxicity category 4
 Unpublished internal reports

Acute inhalation toxicity

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) LC50 - 4 h (dust/mist) : 0.443 mg/l - Rat , male and female
 Method: OECD Test Guideline 403
 This product is classified as acute toxicity category 2
 Unpublished internal reports

Acute dermal toxicity

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) LD50 : > 1,500 mg/kg - Rat , male and female
 Method: OECD Test Guideline 402
 Not classified as hazardous for acute dermal toxicity according to GHS.
 Unpublished internal reports

Acute toxicity (other routes of administration)

No data available

Skin corrosion/irritation

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) Rabbit
 Not irritating to rabbits on cutaneous application.
 Method: OECD Test Guideline 404
 Unpublished internal reports
 As is, not irritating to the skin

Serious eye damage/eye irritation

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) Rabbit
 Risk of serious damage to eyes.
 Method: OECD Test Guideline 405
 Extremely irritating to rabbits on ocular application.
 Unpublished internal reports

Respiratory or skin sensitization

May cause an allergic skin reaction.

Mutagenicity**Genotoxicity in vitro**

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) Mutagenicity (Salmonella typhimurium - reverse mutation assay)
 with and without metabolic activation

negative
 Unpublished internal reports

Mutagenicity (in vitro mammalian cytogenetic test)
 Strain: CHO
 with and without metabolic activation

positive
 Unpublished internal reports

UDS test
 Strain: Rat

negative
 Unpublished internal reports

Rodent dominant Lethal test
Strain: Rat

negative
Unpublished internal reports

Mouse lymphoma test / TK
with and without metabolic activation

positive
Unpublished internal reports

Ames test
with and without metabolic activation

negative
Method: OECD Test Guideline 471
Unpublished reports

Chromosome aberration test in vitro
Strain: CHO
with and without metabolic activation

Positive with metabolic activation and equivocal without metabolic activation
Method: OECD Test Guideline 473
Unpublished reports

Gene mutation assays in mammalian cells.
Strain: mouse lymphoma cells
with and without metabolic activation

positive
Method: OECD Test Guideline 476
Unpublished reports

Genotoxicity in vivo

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1)

In vivo micronucleus test - Mouse males
Oral
Method: OECD Test Guideline 474

negative
Unpublished reports

dominant lethal test - Rat males
Oral
Method: OECD Test Guideline 478

negative
Unpublished reports

Carcinogenicity

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1)

Rat
Oral exposure
Animal testing did not show any carcinogenic effects.
Published data

Mouse
Oral exposure
Animal testing did not show any carcinogenic effects.
Published data

Rat , male and female
Oral
Exposure time: 104 weeks
NOAEL: > 10mg/kg
Method: OECD Test Guideline 453
Unpublished reports

Mouse , male and female
Oral
Exposure time: 104 weeks
NOAEL: > 10mg/kg
Method: OECD Test Guideline 453
Unpublished reports

This product does not contain any ingredient designated as probable or suspected human carcinogens by:

NTP
IARC
OSHA

Toxicity for reproduction and development

Toxicity to reproduction / fertility

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) Two-generation study - Rat, male and female, Oral
Fertility NOAEL Parent: 0.78 mg/kg
Method: OECD Test Guideline 416

Fertility NOAEL F1: 11.7 mg/kg

Developmental Toxicity NOAEL F2: 11.7 mg/kg
Unpublished reports

Developmental Toxicity/Teratogenicity

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) Rat, Oral exposure
General Toxicity Maternal NOEL: 15 mg/kg
Teratogenicity NOEL:30mg/kg
Unpublished internal reports

Rabbit, Oral exposure
 General Toxicity Maternal NOEL: 18 mg/kg
 Teratogenicity NOEL:18mg/kg
 Effects on development were observed, Unpublished internal reports

Rat, female, Oral
 Test period: 10 Days
 General Toxicity Maternal NOAEL: 22.7 mg/kg
 Teratogenicity NOAEL:45.3mg/kg
 Method: OECD Test Guideline 414
 Unpublished reports

Rabbit, female, Oral
 Test period: 13 Days
 General Toxicity Maternal NOAEL: 13.6
 Teratogenicity NOAEL:13.6mg/kg
 Method: OECD Test Guideline 414
 Unpublished reports

STOT**STOT-single exposure**

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) The substance or mixture is not classified as specific target organ toxicant, single exposure according to GHS criteria.
 internal evaluation

STOT-repeated exposure

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) The substance or mixture is not classified as specific target organ toxicant, repeated exposure according to GHS criteria.
 Expert judgment

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) Oral exposure 90 Days - Rat , for males and females
 NOEL: 1 mg/kg
 Liver toxicity
 Unpublished internal reports

Oral 90 Days - Rat , male and female
 NOAEL: 0.75 mg/kg
 Target Organs: Liver
 Method: OECD Test Guideline 408
 Unpublished reports

Oral 90 Days - Dog , male and female
 NOAEL: 0.75 mg/kg
 Target Organs: No specific target organs noted
 Method: OECD Test Guideline 409
 Unpublished reports

Experience with human exposure

No data available

CMR effects**Carcinogenicity**

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) The product is not considered to be carcinogenic.

Mutagenicity

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) not mutagenic

Teratogenicity

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) Suspected human reproductive toxicant (fertility and/or development)

Aspiration toxicity

No data available

SECTION 12: Ecological information**12.1 Toxicity****Aquatic Compartment****Acute toxicity to fish**

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) LC50 - 96 h : 65 mg/l - Pleuronectes platessa (European Plaice)
Unpublished internal reports

LC50 - 96 h : 71 mg/l - Oncorhynchus mykiss (rainbow trout)
semi-static test

Method: according to a standardized method
Unpublished internal reports
Harmful to fish.

NOEC - 32 d : 0.83 mg/l - Pimephales promelas (fathead minnow)
Unpublished internal reports

Acute toxicity to daphnia and other aquatic invertebrates

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) EC50 - 48 h : 11.3 mg/l - Daphnia magna (Water flea)
static test
Method: OECD Test Guideline 202
Unpublished internal reports
Toxic to aquatic invertebrates.

LC50 - 48 h : 0.46 mg/l - Crustacean: Acartia tonsa
static test
Method: ISO 14669 and PARCOM method
Unpublished internal reports
Very toxic to aquatic invertebrates.

NOEC - 21 d : 0.024 mg/l - Daphnia magna (Water flea)
Unpublished internal reports

Toxicity to aquatic plants

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) ErC50 - 72 h : 0.492 mg/l - Algae : Pseudokirchneriella subcapitata
(Selenastrum capricornutum)
static test
Method: OECD Test Guideline 201
Unpublished internal reports
Very toxic to algae.

EC10 - 72 h : 0.44 mg/l - Skeletonema costatum (marine diatom)
Growth rate
Unpublished internal reports

ErC50 - 72 h : 0.12 mg/l - Skeletonema costatum (marine diatom)
static test
Method: ISO 10253
Unpublished internal reports
Very toxic to algae.

NOErC - 72 h : 0.048 mg/l - Algae : Pseudokirchneriella subcapitata
(Selenastrum capricornutum)
static test
Method: OECD Test Guideline 201
Toxic to algae with long lasting effects.
Unpublished internal reports

NOErC - 72 h : 0.075 mg/l - Skeletonema costatum (marine diatom)
static test
Method: ISO 10253
Toxic to algae with long lasting effects.
Unpublished internal reports

Toxicity to microorganisms

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) EC50 - 3 h : 18 mg/l - activated sludge
static test
Method: OECD Test Guideline 209
Unpublished internal reports

Chronic toxicity to fish

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) NOEC: 0.83 mg/l - 32 Days - Pimephales promelas (fathead minnow)
flow-through test
Method: OECD Test Guideline 210
Harmful to fish with long lasting effects.
Unpublished internal reports

Chronic toxicity to daphnia and other aquatic invertebrates

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) NOEC: 0.0242 mg/l - 21 Days - Daphnia magna (Water flea)
semi-static test
Method: OECD Test Guideline 202
Toxic to aquatic invertebrates with long lasting effects.
Unpublished internal reports

Sediment compartment

Toxicity to benthic organisms

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) EC50: 619 mg/kg dry weight (d.w.) Exposure duration: 5 Days
Species: Abra alba
Unpublished internal reports

Terrestrial Compartment

Toxicity to soil dwelling organisms

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) LC50: 960 mg/kg - 14 Days - Eisenia fetida (earthworms)
Method: OECD Test Guideline 207

Toxicity to terrestrial plants

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) EC50: 102 mg/kg - 14 Days - Medicago sativa
Method: OECD Test Guideline 208
Published data
Unpublished internal reports

Unpublished reports

M-Factor

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) Acute aquatic toxicity = 1
(according to the Globally Harmonized System (GHS))

12.2 Persistence and degradability**Abiotic degradation****Stability in water**

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) DT50: Half-life value: 131 Days (25 °C)
anaerobic
pH: 5.0
Method: according to a standardized method
Unpublished internal reports

DT50: Half-life value: 72 Days (25 °C)
anaerobic
pH: 7.0
Method: according to a standardized method
Unpublished internal reports

DT50: Half-life value: 7 Days (25 °C)
anaerobic
pH: 9.0
Method: according to a standardized method
Unpublished internal reports

Photodegradation

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) Sensitizer: OH
Concentration sensitizer in molecule/cm³: 1,500,000 1/cm³
Rate constant in cm³ / molecule*s: 2.7E-11 cm³/s
Half-life indirect photolysis: 0.4 Days
Structure-activity relationship (SAR)
Published data

Physical- and photo-chemical elimination

No data available

Biodegradation**Biodegradability**

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) Ultimate aerobic biodegradability
Method: Simulation study
70 % - 21 d
Readily biodegradable.
US EPA FIFRA, Subdivision N, § 162-4
Unpublished internal reports

anaerobic
Method: Simulation study
60 % - 30 d
US EPA FIFRA, Subdivision N, § 162-4
Unpublished internal reports

aerobic
 Method: Simulation study
 69.6 % - 21 Days
 The substance fulfills the criteria for ultimate aerobic biodegradability and ready biodegradability
 Inoculum: 30g soil+ 90 mL well water
 THPS 75%
 CO2 evolution test
 Unpublished internal reports

Degradability assessment

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) The product is considered to be rapidly degradable in the environment

12.3 Bioaccumulative potential

Partition coefficient: n-octanol/water No data available

Bioconcentration factor (BCF) No data available

12.4 Mobility in soil**Adsorption potential (Koc)**

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) Log Koc: 2.2
 Moderately mobile in soils
 Unpublished internal reports

Adsorption/Soil
 Koc: 153
 Method: OECD Test Guideline 106
 THPS 75%
 Mobile in soils
 Unpublished internal reports

Known distribution to environmental compartments No data available

12.5 Results of PBT and vPvB assessment

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) This substance is not considered to be persistent, bioaccumulating, and toxic (PBT).
 This substance is not considered to be very persistent and very bioaccumulating (vPvB).

12.6 Other adverse effects**Ecotoxicity assessment****Short-term (acute) aquatic hazard**

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) Very toxic to aquatic life.

Long-term (chronic) aquatic hazard

Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) Toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations**13.1 Waste treatment methods****Product Disposal**

Prohibition

- Do not discharge directly into the environment.
- Do not dispose of with domestic refuse.
- Dispose of as hazardous waste in compliance with local and national regulations.
- Chemical additions, processing or otherwise altering this material may make the waste management information presented in this SDS incomplete, inaccurate or otherwise inappropriate. Please be advised that state and local requirements for waste disposal may be more restrictive or otherwise different from federal laws and regulations. Consult state and local regulations regarding the proper disposal of this material.

Advice on cleaning and disposal of packaging**Prohibition**

- Do NOT dispose of untreated packaging with industrial waste.
- Do not dispose of with domestic refuse.
- Empty remaining contents.
- Clean using steam.
- Monitor the residual vapors.
- Dispose of rinse water in accordance with local and national regulations.
- Containers that cannot be cleaned must be treated as waste.
- Dispose of contents/ container to an approved waste disposal plant.
- Dispose of in accordance with local regulations.
- In accordance with IMDG regulations containers or tankers that have not been cleaned or deodorized and that previously contained a hazardous product, must either be labeled or have hazard signs.
- Where possible recycling is preferred to disposal or incineration.
- The recycled material must be completely dry and free of pollutants.

SECTION 14: Transport information

Transportation status: IMPORTANT! Statements below provide additional data on listed transport classification. The listed Transportation Classification does not address regulatory variations due to changes in package size, mode of shipment or other regulatory descriptors.

49 CFR

14.1 UN number	UN 2810
14.2 Proper shipping name	TOXIC, LIQUIDS, ORGANIC, N.O.S. (Tetrakis(hydroxymethyl) phosphonium sulphate)
14.3 Transport hazard class	6.1
Label(s)	6.1
14.4 Packing group	
Packing group	III
ERG No	153
14.5 Environmental hazards	YES
Marine pollutant	

THPS 75%

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TDG

14.1 UN number	UN 2810
14.2 Proper shipping name	TOXIC LIQUID, ORGANIC, N.O.S. (Tetrakis(hydroxymethyl) phosphonium sulphate)
14.3 Transport hazard class Label(s)	6.1 6.1
14.4 Packing group Packing group ERG No	III 153
14.5 Environmental hazards Marine pollutant	YES

NOM

14.1 UN number	UN 2810
14.2 Proper shipping name	TOXIC LIQUID, ORGANIC, N.O.S. (Tetrakis(hydroxymethyl) phosphonium sulphate)
14.3 Transport hazard class Label(s)	6.1 6.1
14.4 Packing group Packing group ERG No	III 153
14.5 Environmental hazards Marine pollutant	YES

IMDG

14.1 UN number	UN 2810
14.2 Proper shipping name	TOXIC LIQUID, ORGANIC, N.O.S. (Tetrakis(hydroxymethyl) phosphonium sulphate)
IMDG Code segregation group	Not Relevant
14.3 Transport hazard class Label(s)	6.1 6.1
14.4 Packing group Packing group	III
14.5 Environmental hazards Marine pollutant	YES

14.6 Special precautions for user

EmS F-A , S-A

For personal protection see section 8.

14.7 Transport in bulk vessels according to IMO instruments

No data available

IATA**14.1 UN number** UN 2810**14.2 Proper shipping name** TOXIC LIQUID, ORGANIC, N.O.S. (Tetrakis(hydroxymethyl) phosphonium sulphate)**14.3 Transport hazard class** 6.1
Label(s): 6.1**14.4 Packing group** III
Packing groupPacking instruction (cargo aircraft) 663
Max net qty / pkg 220.00 L
Packing instruction (passenger aircraft) 655
Max net qty / pkg 60.00 L**14.5 Environmental hazards** YES**14.6 Special precautions for user**

For personal protection see section 8.

Note: The above regulatory prescriptions are those valid on the date of publication of this sheet. Given the possible evolution of transportation regulations for hazardous materials, it would be advisable to check their validity with your sales office.

SECTION 15: Regulatory information**15.1 Notification status**

Inventory Information	Status
United States TSCA Inventory	- All substances listed as active on the TSCA inventory
Canadian Domestic Substances List (DSL)	- Listed on Inventory
Australian Inventory of Industrial Chemicals (AIIC)	- Listed on Inventory
Japan. CSCL - Inventory of Existing and New Chemical Substances	- Listed on Inventory
Korea. Korean Existing Chemicals Inventory (KECI)	- Listed on Inventory
China. Inventory of Existing Chemical Substances in China (IECSC)	- Listed on Inventory
Philippines Inventory of Chemicals and Chemical Substances (PICCS)	- Listed on Inventory

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Taiwan Chemical Substance Inventory (TCSI)	- Listed on Inventory
New Zealand. Inventory of Chemical Substances	- All components are listed on the NZIoC inventory. Additional HSNO obligations may apply. Please refer to Section 15 of SDS for New Zealand.
EU. European Registration, Evaluation, Authorization and Restriction of Chemical (REACH)	- When purchased from a Solvay legal entity based in the EEA ("European Economic Area"), this product is compliant with the registration provisions of the REACH Regulation (EC) No. 1907/2006 as all its components are either excluded, exempt, and/or registered. When purchased from a legal entity outside of the EEA, please contact your local representative for additional information.
Korea. Act on Registration and Evaluation of Chemicals	- When purchased from a Solvay legal entity based in Korea, this product is compliant with "Act on Registration and Evaluation of Chemicals" (AREC or K-REACH, Article 10) as all its components are either excluded, exempt, and/or (pre)registered. When purchased from a legal entity outside of Korea, please contact your local representative for additional information.

15.2 Federal Regulations**US. EPA EPCRA SARA Title III****SARA HAZARD DESIGNATION SECTIONS 311/312 (40 CFR 370)**

Acute toxicity (any route of exposure)	Yes
Respiratory or skin sensitization	Yes
Reproductive toxicity	Yes
Serious eye damage or eye irritation	Yes

The categories not mentioned are not relevant for the product.

Section 313 Toxic Chemicals (40 CFR 372.65)

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Section 302 Emergency Planning Extremely Hazardous Substance Threshold Planning Quantity (40 CFR 355)

This material does not contain any components with a section 302 EHS TPQ.

Section 302 Emergency Planning Extremely Hazardous Substance Reportable Quantity (40 CFR 355)

Components	CAS-No.	Reportable quantity
Formaldehyde	50-00-0	100 lb

Section 304 Emergency Release Notification Reportable Quantity (40 CFR 355)

Components	CAS-No.	Reportable quantity
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Formaldehyde	50-00-0	100 lb
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US. EPA CERCLA Hazardous Substances and Reportable Quantities (40 CFR 302.4)

Components	CAS-No.	Reportable quantity
Formaldehyde	50-00-0	100 lb

15.3 State Regulations**US. California Safe Drinking Water & Toxic Enforcement Act (Proposition 65)**

This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

SECTION 16: Other information**NFPA (National Fire Protection Association) - Classification**

Health	3 serious
Flammability	1 slight
Instability or Reactivity	0 minimal

Further information

- Distribute new edition to clients

Date Prepared: 01/31/2023

Key or legend to abbreviations and acronyms used in the safety data sheet

- TWA: 8-hour, time-weighted average
- SAEL: Solvay Acceptable Exposure Limit
- ACGIH: American Conference of Governmental Industrial Hygienists
- OSHA: Occupational Safety and Health Administration
- NTP: National Toxicology Program
- IARC: International Agency for Research on Cancer
- NIOSH: National Institute for Occupational Safety and Health
- ADR: European Agreement on International Carriage of Dangerous Goods by Road.
- ADN: European Agreement on the International Carriage of Dangerous Goods by Inland Waterways.
- RID: European Agreement concerning the International Carriage of Dangerous Goods by Rail.
- IATA: International Air Transport Association.
- ICAO-TI: Technical Specification for Safe Transport of Dangerous Goods by Air.
- IMDG: International Maritime Dangerous Goods.
- TWA: Time weighted average
- ATE: Estimated value of acute toxicity
- EC: European Community number
- CAS: Chemical Abstracts Service.
- LD50: Substance that causes 50% (half) death in the test animals group (Median Fatal Dose).
- LC50: Substance concentration causing 50% (half) death in the test animals group.
- EC50: Effective Concentration of the substance causing the maximum of 50%.
- PBT: Persistent, Bioaccumulative and Toxic substance.
- vPvB: Very Persistent and Very Bioaccumulative.
- SEA: Classification, labeling, packaging regulation
- DNEL: Derived No Effect Level
- PNEC: Predicted No Effect Concentration
- STOT: Specific Target Organ Toxicity

Not all acronyms listed above are referenced in this SDS.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information, and belief at the date of its publication. Such information is only given as a guidance to help the user handle, use, process, store, transport, dispose, and release the product in satisfactory safety conditions and is not to be considered as a warranty or quality specification. It should be used in conjunction with technical sheets but do not replace them. Thus, the information only relates to the designated specific product and may not be applicable if such product is used in combination with other materials or in any other manufacturing process, unless otherwise specifically indicated. It does not release the user from ensuring he is in conformity with all regulations linked to its activity.

Approved - TL 4-19-23