



# Safety Data Sheet

Cat. # 786-873

TCEP-HCl; Tris (2-carboxyethyl) phosphine-HCl

Size: 5g





# tris(2-carboxyethyl)phosphine hydrochloride

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 05/05/2016

Revision date: 05/11/2017

Version: 7.1

### SECTION 1: Identification

#### 1.1. Identification

|                |  |
|----------------|--|
| Product form   | : Substance  |
| Substance name | : tris(2-carboxyethyl)phosphine hydrochloride  |
| Chemical name  | : TCEP   |
| CAS-No.        | : 51805-45-9   |
| Product code   | : 022T   |
| Formula        | : C9H15O6P.HCl   |
| Synonyms       | : 3,3',3''-phosphinidynetrispropanoic acid, hydrochloride / 3,3',3''-phosphinidynetrispropanoic acid, hydrochloride / propanoic acid, 3,3',3''-phosphinidynetris-, hydrochloride / propionic acid, 3,3',3''-phosphinidynetri-, hydrochloride / TCEP (= tris(2-carboxyethyl)phosphine hydrochloride) / TCEP-HCl (= tris(2-carboxyethyl)phosphine hydrochloride) |
| BIG no         | : 35717  |

#### 1.2. Recommended use and restrictions on use

Use of the substance/mixture : Chemical substance for research

#### 1.3. Supplier

Geno Technology, Inc./ G-Biosciences  
9800 Page Avenue  
Saint Louis, 63132-1429 - United States  
T 800-628-7730 - F 314-991-1504  
[technical@GBiosciences.com](mailto:technical@GBiosciences.com) - [www.GBiosciences.com](http://www.GBiosciences.com)

#### 1.4. Emergency telephone number

Emergency number : Chemtrec **1-800-424-9300** (USA/Canada), **+1-703-527-3887** (Intl)

### SECTION 2: Hazard(s) identification

#### 2.1. Classification of the substance or mixture

##### GHS-US classification

Skin corrosion/irritation H314 Causes severe skin burns and eye damage  
Category 1B

Full text of H statements : see section 16

#### 2.2. GHS Label elements, including precautionary statements

##### GHS-US labeling

Hazard pictograms (GHS-US) :



|                                   |  |
|-----------------------------------|--|
| Signal word (GHS-US)              | : Danger   |
| Hazard statements (GHS-US)        | : H314 - Causes severe skin burns and eye damage   |
| Precautionary statements (GHS-US) | : P260 - Do not breathe dust/fume/gas/mist/vapors/spray.<br>P264 - Wash hands, forearms and face thoroughly after handling.<br>P280 - Wear protective gloves/protective clothing/eye protection/face protection.<br>P301+P330+P331 - If swallowed: rinse mouth. Do NOT induce vomiting<br>P303+P361+P353 - If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower<br>P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing<br>P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing<br>P310 - Immediately call a poison center or doctor<br>P321 - Specific treatment (see supplemental first aid instruction on this label)<br>P363 - Wash contaminated clothing before reuse.<br>P405 - Store locked up.<br>P501 - Dispose of contents/container to hazardous or special waste collection point, in accordance with local, regional, national and/or international regulation |

# tris(2-carboxyethyl)phosphine hydrochloride

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

### 2.3. Other hazards which do not result in classification

No additional information available

### 2.4. Unknown acute toxicity (GHS US)

Not applicable

## SECTION 3: Composition/Information on ingredients

### 3.1. Substances

Substance type : Mono-constituent

| Name  | Common Name (Synonyms)  | Product identifier   | %   | GHS-US classification |
|---|---|----------------------|-----|-----------------------|
| tris(2-carboxyethyl)phosphine hydrochloride<br>(Main constituent) | 3,3',3''-phosphinidynetripopropanoic acid, hydrochloride / 3,3',3''-phosphinidynetrispropanoic acid, hydrochloride / propanoic acid, 3,3',3''-phosphinidynetris-, hydrochloride / propionic acid, 3,3',3''-phosphinidynetri-, hydrochloride / TCEP (= tris(2-carboxyethyl)phosphine hydrochloride) / TCEP-HCl (= tris(2-carboxyethyl)phosphine hydrochloride) | (CAS-No.) 51805-45-9 | 100 | Skin Corr. 1B, H314   |

Full text of hazard classes and H-statements : see section 16

### 3.2. Mixtures

Not applicable

## SECTION 4: First-aid measures

### 4.1. Description of first aid measures

|                                       |   |
|---------------------------------------|---|
| First-aid measures general            | : Check the vital functions. Unconscious: maintain adequate airway and respiration. Respiratory arrest: artificial respiration or oxygen. Cardiac arrest: perform resuscitation. Victim conscious with laboured breathing: half-seated. Victim in shock: on his back with legs slightly raised. Vomiting: prevent asphyxia/aspiration pneumonia. Prevent cooling by covering the victim (no warming up). Keep watching the victim. Give psychological aid. Keep the victim calm, avoid physical strain. Depending on the victim's condition: doctor/hospital. |
| First-aid measures after inhalation   | : Remove the victim into fresh air. Respiratory problems: consult a doctor/medical service.   |
| First-aid measures after skin contact | : Wash immediately with lots of water (15 minutes)/shower. Do not apply (chemical) neutralizing agents. Remove clothing while washing. Do not remove clothing if it sticks to the skin. Cover wounds with sterile bandage. Consult a doctor/medical service. If burned surface > 10%: take victim to hospital.  |
| First-aid measures after eye contact  | : Rinse immediately with plenty of water for 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Take victim to an ophthalmologist. Do not apply neutralizing agents.   |
| First-aid measures after ingestion    | : Rinse mouth with water. Immediately after ingestion: give lots of water to drink. Do not induce vomiting. Do not give activated charcoal. Immediately consult a doctor/medical service. Call Poison Information Centre ( <a href="http://www.big.be/antigif.htm">www.big.be/antigif.htm</a> ). Take the container/vomit to the doctor/hospital. Ingestion of large quantities: immediately to hospital. Do not give chemical antidote.  |

### 4.2. Most important symptoms and effects (acute and delayed)

|   |  |
|---|--|
| Potential Adverse human health effects and symptoms | : Practically non-toxic if swallowed (LD50 oral 2000/5000 mg/kg). Causes severe skin burns. Practically non-toxic through skin (LD50 skin 2000/5000 mg/kg). Corrosive to the respiratory tract. Causes serious eye damage. |
| Symptoms/effects after inhalation                   | : AFTER INHALATION OF DUST/MIST: Corrosion of the upper respiratory tract.   |
| Symptoms/effects after skin contact                 | : Caustic burns/corrosion of the skin.   |
| Symptoms/effects after eye contact                  | : Corrosion of the eye tissue.   |
| Symptoms/effects after ingestion                    | : Burns.   |

### 4.3. Immediate medical attention and special treatment, if necessary

Treat symptomatically.

## SECTION 5: Fire-fighting measures

### 5.1. Suitable (and unsuitable) extinguishing media

|                                |  |
|--------------------------------|--|
| Suitable extinguishing media   | : Quick-acting ABC powder extinguisher. Class A foam extinguisher. Water (quick-acting extinguisher, reel). Water. Class A foam. |
| Unsuitable extinguishing media | : Quick-acting BC powder extinguisher. Quick-acting CO2 extinguisher.  |

# tris(2-carboxyethyl)phosphine hydrochloride

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

### 5.2. Specific hazards arising from the chemical

- Fire hazard : DIRECT FIRE HAZARD: Most organic solids may burn if strongly heated. In finely divided state: increased fire hazard. INDIRECT FIRE HAZARD: Heating increases the fire hazard.
- Explosion hazard : DIRECT EXPLOSION HAZARD: Most organic solids are liable to dust explosion hazard. INDIRECT EXPLOSION HAZARD: Dust cloud can be ignited by a spark.
- Reactivity : The product is non-reactive under normal conditions of use, storage and transport.

### 5.3. Special protective equipment and precautions for fire-fighters

- Precautionary measures fire : Exposure to fire/heat: keep upwind. Exposure to fire/heat: consider evacuation. Exposure to fire/heat: have neighbourhood close doors and windows.
- Firefighting instructions : Dilute toxic gases with water spray. Take account of toxic fire-fighting water. Use water moderately and if possible collect or contain it.
- Protection during firefighting : Heat/fire exposure: compressed air/oxygen apparatus.

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

#### 6.1.1. For non-emergency personnel

- Protective equipment : Gloves. Face-shield. Corrosion-proof suit. Dust cloud production: compressed air/oxygen apparatus.
- Emergency procedures : Mark the danger area. Prevent dust cloud formation. No naked flames. Wash contaminated clothes.
- Measures in case of dust release : In case of dust production: keep upwind. Dust production: have neighbourhood close doors and windows.

#### 6.1.2. For emergency responders

- Protective equipment : Do not attempt to take action without suitable protective equipment. For further information refer to section 8: "Exposure controls/personal protection".

### 6.2. Environmental precautions

- Prevent soil and water pollution. Prevent spreading in sewers.

### 6.3. Methods and material for containment and cleaning up

- For containment : Contain released product, pump into suitable containers. Plug the leak, cut off the supply. Dam up the solid spill. Knock down/dilute dust cloud with water spray. Take account of toxic/corrosive precipitation water.
- Methods for cleaning up : Prevent dust cloud formation. Scoop solid spill into closing containers. Carefully collect the spill/leftovers. Take collected spill to manufacturer/competent authority. Clean contaminated surfaces with an excess of water. Wash clothing and equipment after handling.
- Other information : Dispose of materials or solid residues at an authorized site.

### 6.4. Reference to other sections

- For further information refer to section 13.

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

- Precautions for safe handling : Avoid raising dust. Keep away from naked flames/heat. In finely divided state: use spark-/explosionproof appliances. Finely divided: keep away from ignition sources/sparks. Carry operations in the open/under local exhaust/ventilation or with respiratory protection. Comply with the legal requirements. Remove contaminated clothing immediately. Clean contaminated clothing. Do not discharge the waste into the drain. Powdered form: no compressed air for pumping over. Keep container tightly closed.
- Hygiene measures : Wash contaminated clothing before reuse. Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

### 7.2. Conditions for safe storage, including any incompatibilities

- Storage conditions : Store locked up. Store in a well-ventilated place. Keep cool.
- Heat-ignition : KEEP SUBSTANCE AWAY FROM: heat sources. ignition sources.
- Information on mixed storage : KEEP SUBSTANCE AWAY FROM: oxidizing agents. halogens.
- Storage area : Store in a dry area. Keep container in a well-ventilated place. Keep locked up. May be stored under nitrogen. May be stored under argon. Meet the legal requirements.
- Special rules on packaging : SPECIAL REQUIREMENTS: closing. correctly labelled. meet the legal requirements. Secure fragile packagings in solid containers.

# tris(2-carboxyethyl)phosphine hydrochloride

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

### SECTION 8: Exposure controls/personal protection

#### 8.1. Control parameters

No additional information available

#### 8.2. Appropriate engineering controls

Appropriate engineering controls : Ensure good ventilation of the work station.

Environmental exposure controls : Avoid release to the environment.

#### 8.3. Individual protection measures/Personal protective equipment

##### Hand protection:

Gloves

##### Eye protection:

Face shield. In case of dust production: protective goggles

##### Skin and body protection:

Corrosion-proof clothing. In case of dust production: head/neck protection

##### Respiratory protection:

Dust production: dust mask with filter type P3. High dust production: self-contained breathing apparatus

### SECTION 9: Physical and chemical properties

#### 9.1. Information on basic physical and chemical properties

|   |  |
|---|--|
| Physical state                              | : Solid                                  |
| Appearance                                  | : Crystalline solid. Crystalline powder. |
| Color                                       | : White                                  |
| Odor  | : Odourless                              |
| Odor threshold                              | : No data available                      |
| pH  | : No data available                      |
| Melting point                               | : No data available                      |
| Freezing point                              | : Not applicable                         |
| Boiling point                               | : No data available                      |
| Flash point                                 | : Not applicable                         |
| Relative evaporation rate (butyl acetate=1) | : No data available                      |
| Flammability (solid, gas)                   | : Non flammable.                         |
| Vapor pressure                              | : No data available                      |
| Relative vapor density at 20 °C             | : Not applicable                         |
| Relative density                            | : Not applicable                         |
| Molecular mass                              | : 286.65 g/mol                           |
| Solubility                                  | : Soluble in water.<br>Water: 31 g/100ml |
| Log Pow                                     | : No data available                      |
| Auto-ignition temperature                   | : Not applicable                         |
| Decomposition temperature                   | : No data available                      |
| Viscosity, kinematic                        | : No data available                      |
| Viscosity, dynamic                          | : No data available                      |
| Explosion limits                            | : Not applicable                         |
| Explosive properties                        | : No data available                      |
| Oxidizing properties                        | : No data available                      |

#### 9.2. Other information

VOC content : 0 %

# tris(2-carboxyethyl)phosphine hydrochloride

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

### SECTION 10: Stability and reactivity

#### 10.1. Reactivity

The product is non-reactive under normal conditions of use, storage and transport.

#### 10.2. Chemical stability

Stable under normal conditions.

#### 10.3. Possibility of hazardous reactions

No dangerous reactions known under normal conditions of use.

#### 10.4. Conditions to avoid

None under recommended storage and handling conditions (see section 7).

#### 10.5. Incompatible materials

No additional information available

#### 10.6. Hazardous decomposition products

Hazardous decomposition products.

### SECTION 11: Toxicological information

#### 11.1. Information on toxicological effects

Acute toxicity (oral) : Not classified

Acute toxicity (dermal) : Not classified

Acute toxicity (inhalation) : Not classified

#### tris(2-carboxyethyl)phosphine hydrochloride (51805-45-9)

|                 |                            |
|-----------------|----------------------------|
| LD50 oral rat   | 3500 mg/kg (Rat, Oral)     |
| LD50 dermal rat | > 3000 mg/kg (Rat, Dermal) |

Skin corrosion/irritation : Causes severe skin burns and eye damage.

Serious eye damage/irritation : Eye damage, category 1, implicit

Respiratory or skin sensitization : Not classified

Germ cell mutagenicity : Not classified

Carcinogenicity : Not classified

Reproductive toxicity : Not classified

Specific target organ toxicity – single exposure : Not classified

Specific target organ toxicity – repeated exposure : Not classified

Aspiration hazard : Not classified

Viscosity, kinematic : No data available

Potential Adverse human health effects and symptoms : Practically non-toxic if swallowed (LD50 oral 2000/5000 mg/kg). Causes severe skin burns. Practically non-toxic through skin (LD50 skin 2000/5000 mg/kg). Corrosive to the respiratory tract. Causes serious eye damage.

Symptoms/effects after inhalation : AFTER INHALATION OF DUST/MIST: Corrosion of the upper respiratory tract.

Symptoms/effects after skin contact : Caustic burns/corrosion of the skin.

Symptoms/effects after eye contact : Corrosion of the eye tissue.

Symptoms/effects after ingestion : Burns.

### SECTION 12: Ecological information

#### 12.1. Toxicity

Ecology - general : Before neutralisation, the product may represent a danger to aquatic organisms.

Ecology - air : Not classified as dangerous for the ozone layer (Regulation (EC) No 1005/2009).

Ecology - water : No data available on ecotoxicity.

#### 12.2. Persistence and degradability

#### tris(2-carboxyethyl)phosphine hydrochloride (51805-45-9)

|                               |   |
|-------------------------------|---|
| Persistence and degradability | Biodegradability in water: no data available. |
|-------------------------------|---|

# tris(2-carboxyethyl)phosphine hydrochloride

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

### 12.3. Bioaccumulative potential

#### tris(2-carboxyethyl)phosphine hydrochloride (51805-45-9)

|                           |                                    |
|---------------------------|------------------------------------|
| Bioaccumulative potential | No bioaccumulation data available. |
|---------------------------|------------------------------------|

### 12.4. Mobility in soil

No additional information available

### 12.5. Other adverse effects

No additional information available

## SECTION 13: Disposal considerations

### 13.1. Disposal methods

|  |  |
|--|--|
| Waste treatment methods                    | : Waste treatment methods.   |
| Product/Packaging disposal recommendations | : Remove waste 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. Remove to an incinerator for chlorinated waste materials with energy recovery. Dissolve or mix with a combustible solvent. |
| Additional information                     | : Hazardous waste according to Directive 2008/98/EC, as amended by Regulation (EU) No 1357/2014 and Regulation (EU) No 2017/997.   |

## SECTION 14: Transport information

### Department of Transportation (DOT)

In accordance with DOT

|                                |  |
|--------------------------------|--|
| Transport document description | : UN3261 Corrosive solid, acidic, organic, n.o.s., 8, II |
| UN-No.(DOT)                    | : UN3261   |
| Proper Shipping Name (DOT)     | : Corrosive solid, acidic, organic, n.o.s.               |
| Class (DOT)                    | : 8 - Class 8 - Corrosive material 49 CFR 173.136        |
| Packing group (DOT)            | : II - Medium Danger                                     |
| Hazard labels (DOT)            | : 8 - Corrosive  |



|   |   |
|---|---|
| DOT Packaging Non Bulk (49 CFR 173.xxx) | : 212   |
| DOT Packaging Bulk (49 CFR 173.xxx)     | : 240   |
| DOT Symbols                             | : G - Identifies PSN requiring a technical name |

# tris(2-carboxyethyl)phosphine hydrochloride

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

|  |  |
|--|--|
| DOT Special Provisions (49 CFR 172.102)                          | : IB8 - Authorized IBCs: Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N); Rigid plastics (11H1, 11H2, 21H1, 21H2, 31H1 and 31H2); Composite (11HZ1, 11HZ2, 21HZ1, 21HZ2, 31HZ1 and 31HZ2); Fiberboard (11G); Wooden (11C, 11D and 11F); Flexible (13H1, 13H2, 13H3, 13H4, 13H5, 13L1, 13L2, 13L3, 13L4, 13M1 or 13M2).<br>IP2 - When IBCs other than metal or rigid plastics IBCs are used, they must be offered for transportation in a closed freight container or a closed transport vehicle.<br>IP4 - Flexible, fiberboard or wooden IBCs must be sift-proof and water-resistant or be fitted with a sift-proof and water-resistant liner.<br>T3 - 2.65 178.274(d)(2) Normal..... 178.275(d)(2)<br>TP33 - The portable tank instruction assigned for this substance applies for granular and powdered solids and for solids which are filled and discharged at temperatures above their melting point which are cooled and transported as a solid mass. Solid substances transported or offered for transport above their melting point are authorized for transportation in portable tanks conforming to the provisions of portable tank instruction T4 for solid substances of packing group III or T7 for solid substances of packing group II, unless a tank with more stringent requirements for minimum shell thickness, maximum allowable working pressure, pressure-relief devices or bottom outlets are assigned in which case the more stringent tank instruction and special provisions shall apply. Filling limits must be in accordance with portable tank special provision TP3. Solids meeting the definition of an elevated temperature material must be transported in accordance with the applicable requirements of this subchapter. |
| DOT Packaging Exceptions (49 CFR 173.xxx)                        | : 154  |
| DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) | : 15 kg  |
| DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75)     | : 50 kg  |
| DOT Vessel Stowage Location                                      | : B - (i) The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers, or one passenger per each 3 m of overall vessel length; and (ii) "On deck only" on passenger vessels in which the number of passengers specified in paragraph (k)(2)(i) of this section is exceeded.  |
| Emergency Response Guide (ERG) Number                            | : 154  |
| Other information  | : No supplementary information available.  |

### Transportation of Dangerous Goods

#### Transport by sea

|                                       |   |
|---------------------------------------|---|
| Transport document description (IMDG) | : UN 3261 Corrosive solid, acidic, organic, n.o.s., 8, II |
| UN-No. (IMDG)                         | : 3261  |
| Proper Shipping Name (IMDG)           | : Corrosive solid, acidic, organic, n.o.s.                |
| Class (IMDG)                          | : 8 - Corrosive substances                                |
| Packing group (IMDG)                  | : II - substances presenting medium danger                |
| EmS-No. (1)                           | : F-A   |
| EmS-No. (2)                           | : S-B   |

#### Air transport

|                                       |   |
|---------------------------------------|---|
| Transport document description (IATA) | : UN 3261 Corrosive solid, acidic, organic, n.o.s., 8, II |
| UN-No. (IATA)                         | : 3261  |
| Proper Shipping Name (IATA)           | : Corrosive solid, acidic, organic, n.o.s.                |
| Class (IATA)                          | : 8 - Corrosives  |
| Packing group (IATA)                  | : II - Medium Danger                                      |

## SECTION 15: Regulatory information

### 15.1. US Federal regulations

#### tris(2-carboxyethyl)phosphine hydrochloride (51805-45-9)

Not listed on the United States TSCA (Toxic Substances Control Act) inventory

### 15.2. International regulations

#### CANADA

No additional information available



# tris(2-carboxyethyl)phosphine hydrochloride

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

### EU-Regulations

No additional information available

### National regulations

No additional information available

### 15.3. US State regulations

No additional information available

## SECTION 16: Other information

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Revision date : 05/11/2017

Full text of H-phrases:

|      |   |
|------|---|
| H314 | Causes severe skin burns and eye damage |
|------|---|

SDS US (GHS HazCom 2012)

*This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product*