SAFETY DATA SHEET

1. Identification

Product identifier: Trichloroethylene

Other means of identification
Product No.: 9464, 8600, 9458, 9454

Recommended use and restriction on use
  Recommended use: Not available.
  Restrictions on use: Not known.

Manufacturer/Importer/Supplier/Distributor Information

Manufacturer
  Company Name: Avantor Performance Materials, Inc.
  Address: 3477 Corporate Parkway, Suite 200
            Center Valley, PA 18034
  Telephone: Customer Service: 855-282-6867
  Fax: Contact Person: Environmental Health & Safety
  e-mail: info@avantormaterials.com

Emergency telephone number:
  24 Hour Emergency: 908-859-2151

  Chemtrec: 800-424-9300

2. Hazard(s) identification

Hazard Classification
  Health Hazards
  Skin Corrosion/Irritation Category 2
  Serious Eye Damage/Eye Irritation Category 2A
  Germ Cell Mutagenicity Category 2
  Carcinogenicity Category 1B
  Specific Target Organ Toxicity - Single Exposure Category 3

Environmental Hazards
  Chronic hazards to the aquatic environment Category 3

Label Elements
  Hazard Symbol:

  Signal Word: Danger
Hazard Statement: May cause cancer. Suspected of causing genetic defects. Causes serious eye irritation. Causes skin irritation. Harmful to aquatic life with long lasting effects.

Precautionary Statement

Prevention: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection. Wash hands thoroughly after handling. Avoid breathing dust/fume/gas/mist/vapors/spray. Avoid release to the environment.

Response: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash before reuse. Call a POISON CENTER or doctor/physician if you feel unwell. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

Storage: Store locked up. Store in a well-ventilated place. Keep container tightly closed.

Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in GHS classification: None.

3. Composition/information on ingredients

Substances

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>Common name and synonyms</th>
<th>CAS number</th>
<th>Content in percent (%)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRICHLOROETHYLENE</td>
<td></td>
<td>79-01-6</td>
<td>99 - 100%</td>
</tr>
</tbody>
</table>

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

General information: Get medical advice/attention if you feel unwell. Show this safety data sheet to the doctor in attendance.

Ingestion: Rinse mouth. Get medical attention if symptoms occur. Do not induce vomiting without advice from poison control center. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

Inhalation: Move to fresh air. Get medical attention if symptoms persist. If breathing stops, provide artificial respiration.

Skin Contact: Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention if irritation persists after washing. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.
Eye contact: Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention if irritation persists after washing.

Most important symptoms/effects, acute and delayed

Symptoms: Irritating to eyes, respiratory system and skin.

Indication of immediate medical attention and special treatment needed

Treatment: Treat symptomatically. Symptoms may be delayed.

5. Fire-fighting measures

General Fire Hazards: In case of fire and/or explosion do not breathe fumes.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: Use fire-extinguishing media appropriate for surrounding materials.

Unsuitable extinguishing media: Do not use water jet as an extinguisher, as this will spread the fire.

Specific hazards arising from the chemical: Contact with metals may evolve flammable hydrogen gas. Fire may produce irritating, corrosive and/or toxic gases.

Special protective equipment and precautions for firefighters

Special fire fighting procedures: Move containers from fire area if you can do so without risk. Use water spray to keep fire-exposed containers cool. Cool containers exposed to flames with water until well after the fire is out.

Special protective equipment for fire-fighters: Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures: Keep unauthorized personnel away. Use personal protective equipment. See Section 8 of the MSDS for Personal Protective Equipment. Ventilate closed spaces before entering them. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Methods and material for containment and cleaning up: Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. Dike far ahead of larger spill for later recovery and disposal.

Notification Procedures: Dike for later disposal. Prevent entry into waterways, sewer, basements or confined areas. Stop the flow of material, if this is without risk. Inform authorities if large amounts are involved.

Environmental Precautions: Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.
7. Handling and storage

Precautions for safe handling: Use personal protective equipment as required. Do not breathe mist or vapor. Do not taste or swallow. Do not eat, drink or smoke when using the product. Use only with adequate ventilation. Wash hands thoroughly after handling. See Section 8 of the MSDS for Personal Protective Equipment. Avoid contact with eyes. Avoid contact with skin. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection. Avoid breathing dust/fume/gas/mist/vapors/spray. Wash contaminated clothing before reuse.

Conditions for safe storage, including any incompatibilities:

Store locked up. Keep in a cool, well-ventilated place. Store in a dry place.

8. Exposure controls/personal protection

Control Parameters

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>Type</th>
<th>Exposure Limit Values</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRICHLOROETHYLENE</td>
<td>TWA</td>
<td>10 ppm</td>
<td>US. ACGIH Threshold Limit Values (2011)</td>
</tr>
<tr>
<td></td>
<td>STEL</td>
<td>25 ppm</td>
<td>US. ACGIH Threshold Limit Values (2011)</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>50 ppm 270 mg/m³</td>
<td>US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)</td>
</tr>
<tr>
<td></td>
<td>STEL</td>
<td>200 ppm 1,080 mg/m³</td>
<td>US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>100 ppm</td>
<td>US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)</td>
</tr>
<tr>
<td></td>
<td>Ceiling</td>
<td>200 ppm</td>
<td>US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)</td>
</tr>
<tr>
<td></td>
<td>MAX. CONC</td>
<td>300 ppm</td>
<td>US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)</td>
</tr>
<tr>
<td></td>
<td>AN ESL</td>
<td>54 µg/m³</td>
<td>US. Texas. Effects Screening Levels (Texas Commission on Environmental Quality) (12 2010)</td>
</tr>
</tbody>
</table>

Biological Limit Values

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>Exposure Limit Values</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRICHLOROETHYLENE</td>
<td>15 mg/l (Urine)</td>
<td>ACGIH BEL (03 2013)</td>
</tr>
<tr>
<td>(Trichloroacetic acid; Sampling time: End of shift at end of work week.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRICHLOROETHYLENE</td>
<td>0.5 mg/l (Blood)</td>
<td>ACGIH BEL (03 2013)</td>
</tr>
<tr>
<td>(Trichloroethanol, without hydrolysis; Sampling time: End of shift at end of work week.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Appropriate Engineering Controls

No data available.

Individual protection measures, such as personal protective equipment

General information: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. An eye wash and safety shower must be available in the immediate work area.
Eye/face protection: Wear safety glasses with side shields (or goggles) and a face shield.

Skin Protection
Hand Protection: Chemical resistant gloves

Other: Wear suitable protective clothing.

Respiratory Protection: In case of inadequate ventilation use suitable respirator.

Hygiene measures: Provide eyewash station and safety shower. Observe good industrial hygiene practices. Wash hands before breaks and immediately after handling the product. Do not eat, drink or smoke when using the product. Wash contaminated clothing before reuse.

9. Physical and chemical properties

Appearance

Physical state: Liquid
Form: Liquid
Color: Colorless
Odor: Ether-like odor
Odor threshold: No data available.
pH: No data available.
Melting point/freezing point: -84.7 °C
Initial boiling point and boiling range: 87.2 °C
Flash Point: Not applicable
Evaporation rate: No data available.
Flammability (solid, gas): No data available.

Upper/lower limit on flammability or explosive limits

Flammability limit - upper (%): 10.5 %(V)
90 %(V)
Flammability limit - lower (%): 8 %(V)
12.5 %(V)
Explosive limit - upper (%): No data available.
Explosive limit - lower (%): No data available.

Vapor pressure: 9.2 kPa (25 °C)
Vapor density: 4.53 AIR=1
Relative density: 1.47 (20 °C)
Solubility(ies)
Solubility in water: 1 g/l (20 °C)
Solubility (other): acetone: Soluble
ethanol: Soluble

Partition coefficient (n-octanol/water): 2.61
Auto-ignition temperature: 420 °C
Decomposition temperature: No data available.
Viscosity: No data available.

Other information
Molecular weight: 131.39 g/mol (C2HCl3)

10. Stability and reactivity

Reactivity: No dangerous reaction known under conditions of normal use.
Chemical Stability: Material is stable under normal conditions.

Possibility of Hazardous Reactions: Hazardous polymerization does not occur.


Hazardous Decomposition Products: By heating and fire, toxic vapors/gases may be formed. Oxides of Carbon. Phosgene.

11. Toxicological Information

Information on likely routes of exposure

Ingestion: May be harmful if swallowed.

Inhalation: May be harmful if inhaled.

Skin Contact: Causes skin irritation.

Eye contact: Causes serious eye irritation.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral Product: LD 50 (Rat): 4,920 mg/kg

Dermal Product: No data available.

Inhalation Product: LC 50 (Rat, 4 h): 12000 ppm

Repeated Dose Toxicity Product: No data available.

Skin Corrosion/Irritation Product: Causes skin irritation.

Serious Eye Damage/Eye Irritation Product: Causes serious eye irritation.

Respiratory or Skin Sensitization Product: Not a skin sensitizer.

Carcinogenicity Product: May cause cancer.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:

TRICHLOROETHYLENE Overall evaluation: 1. Carcinogenic to humans.

US. National Toxicology Program (NTP) Report on Carcinogens:

TRICHLOROETHYLENE Reasonably Anticipated to be a Human Carcinogen.
No carcinogenic components identified

Germ Cell Mutagenicity

In vitro
Product: Suspected of causing genetic defects.

In vivo
Product: Suspected of causing genetic defects.

Reproductive Toxicity
Product: No components toxic to reproduction

Specific Target Organ Toxicity - Single Exposure
Product: May cause respiratory irritation. May cause drowsiness or dizziness.

Specific Target Organ Toxicity - Repeated Exposure
Product: No data available.

Aspiration Hazard
Product: Not classified

Other Effects: None known.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish
Product: No data available.

Specified substance(s):
TRICHLOROETHYLENE
LC 50 (Fathead minnow (Pimephales promelas), 96 h): 31.4 - 71.8 mg/l Mortality
LC 50 (Bluegill (Lepomis macrochirus), 96 h): 39 - 54 mg/l Mortality
EC 50 (Fathead minnow (Pimephales promelas), 96 h): 18.4 - 28.5 mg/l Intoxication

Aquatic Invertebrates
Product: No data available.

Specified substance(s):
TRICHLOROETHYLENE
LC 50 (Water flea (Daphnia magna), 48 h): 12 - 26 mg/l Mortality

Chronic hazards to the aquatic environment:

Fish
Product: No data available.

Aquatic Invertebrates
Product: No data available.

Toxicity to Aquatic Plants
Product: No data available.

Persistence and Degradability

Biodegradation
Product: There are no data on the degradability of this product.
BOD/COD Ratio
Product: No data available.

Bioaccumulative Potential
Bioconcentration Factor (BCF)
Product: No data available on bioaccumulation.

Partition Coefficient n-octanol / water (log Kow)
Product: Log Kow: 2.61

Mobility in Soil: The product is water soluble and may spread in water systems.

Other Adverse Effects: Harmful to aquatic life with long lasting effects.

13. Disposal considerations

Disposal instructions: Discharge, treatment, or disposal may be subject to national, state, or local laws.

Contaminated Packaging: Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT
UN Number: UN 1710
UN Proper Shipping Name: Trichloroethylene
Transport Hazard Class(es)
Class(es): 6.1
Label(s): 6.1
Packing Group: III
Marine Pollutant: No

IMDG
UN Number: UN 1710
UN Proper Shipping Name: TRICHLOROETHYLENE
Transport Hazard Class(es)
Class(es): 6.1
Label(s): 6.1
EmS No.: F-A, S-A
Packing Group: III
Marine Pollutant: No

IATA
UN Number: UN 1710
Proper Shipping Name: Trichloroethylene
Transport Hazard Class(es)
Class(es): 6.1
Label(s): 6.1
Marine Pollutant: No
Packing Group: III

15. Regulatory information

US Federal Regulations
TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)
US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)
None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):
TRICHLOROETHYLENE Reportable quantity: 100 lbs.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

- [x] Acute (Immediate)
- [x] Chronic (Delayed)
- [ ] Fire
- [ ] Reactive
- [ ] Pressure Generating

SARA 302 Extremely Hazardous Substance
None present or none present in regulated quantities.

SARA 304 Emergency Release Notification

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>RQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRICHLOROETHYLENE</td>
<td>100 lbs</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazardous Chemical

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>Threshold Planning Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRICHLOROETHYLENE</td>
<td>500 lbs</td>
</tr>
</tbody>
</table>

SARA 313 (TRI Reporting)

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>Reporting threshold for other users</th>
<th>Reporting threshold for manufacturing and processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRICHLOROETHYLENE</td>
<td>10000 lbs</td>
<td>25000 lbs.</td>
</tr>
</tbody>
</table>

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)
TRICHLOROETHYLENE Reportable quantity: 100 lbs.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):
None present or none present in regulated quantities.

US State Regulations

US. California Proposition 65
TRICHLOROETHYLENE Carcinogenic.
TRICHLOROETHYLENE Male reproductive toxin.
TRICHLOROETHYLENE Developmental toxin.

US. New Jersey Worker and Community Right-to-Know Act
TRICHLOROETHYLENE Listed

US. Massachusetts RTK - Substance List
TRICHLOROETHYLENE Listed

US. Pennsylvania RTK - Hazardous Substances
TRICHLOROETHYLENE Listed

US. Rhode Island RTK
TRICHLOROETHYLENE Listed
Inventory Status:

- Australia AICS: On or in compliance with the inventory
- Canada DSL Inventory List: On or in compliance with the inventory
- EINECS, ELINCS or NLP: On or in compliance with the inventory
- Japan (ENCS) List: On or in compliance with the inventory
- China Inv. Existing Chemical Substances: On or in compliance with the inventory
- Korea Existing Chemicals Inv. (KECI): Not in compliance with the inventory.
- Canada NDSL Inventory: On or in compliance with the inventory
- Philippines PICCS: On or in compliance with the inventory
- US TSCA Inventory: On or in compliance with the inventory
- New Zealand Inventory of Chemicals: On or in compliance with the inventory
- Japan ISHL Listing: On or in compliance with the inventory
- Japan Pharmacopoeia Listing: Not in compliance with the inventory.

16. Other information, including date of preparation or last revision

NFPA Hazard ID

- Flammability
- Health
- Reactivity
- Special hazard.

Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe

Issue Date: 01-08-2015
Revision Date: No data available.
Version #: 1.1
Further Information: No data available.
Disclaimer:

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