

SAFETY DATA SHEET



Date of issue 10/26/2013. (month/day/year)

Version 1

Section 1. Chemical product and company identification

- A. Product name** : TRI119 - Trichloroethylene Fluorocarbon
Product code : 01552
- B. Relevant identified uses of the substance or mixture and uses advised against**
- Product use** : Industrial applications.
- Uses advised against** : None identified.
- C. Supplier's information** : Axiall, LLC
115 Perimeter Center Place
Suite 460
Atlanta, GA 30346
USA
- Email Address** : Namduck Corporation
Email : namduck@namduck.co.kr
Tel : +82 2 3774 0900
msdsinfo@axiall.com
- Emergency telephone number:** : +1 304-455-6882

Section 2. Hazards identification

- A. Hazard classification** : SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2
CARCINOGENICITY - Category 1
AQUATIC TOXICITY (CHRONIC) - Category 3
- B. GHS label elements, including precautionary statements**
- Symbol** :
- Signal word** : Danger
- Hazard statements** : Causes serious eye irritation.
May cause cancer.
Harmful to aquatic life with long lasting effects.
- Precautionary statements**
- Prevention** : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Wear eye or face protection. Avoid release to the environment. Wash hands thoroughly after handling.

Section 2. Hazards identification

- Response** : IF exposed or concerned: Get medical attention. 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 attention.
- Storage** : Store locked up.
- Disposal** : Dispose of contents and container in accordance with all local, regional, national and international regulations.

- C. Other hazards which do not result in classification** : Aspiration hazard if swallowed. Can enter lungs and cause damage.
- Prolonged or repeated contact may dry skin and cause irritation.
- Do not ship lightly stabilized grades in aluminum trailers.

Section 3. Composition/information on ingredients

Chemical name : TRICHLOROETHYLENE

CAS number/other identifiers

CAS number : 79-01-6

EC number : 201-167-4

Chemical name	Common name	CAS #	%
Trichloroethylene	Trichloroethylene	79-01-6	> 99

(stabilized)

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

SUB codes represent substances without registered CAS Numbers.

Section 4. First aid measures

- A. Eye contact** : Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Seek immediate medical attention.
- B. Skin contact** : Remove contaminated clothing and shoes. Wash skin thoroughly with soap and water or use recognized skin cleanser. Seek medical attention if irritation persists.
- C. Inhalation** : Remove to fresh air. Keep person warm and at rest. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Seek medical attention.
- D. Ingestion** : If swallowed, seek medical advice immediately and show this container or label. Keep person warm and at rest. Do NOT induce vomiting.
- E. Notes to physician** :

Section 4. First aid measures

Only administer adrenaline after careful consideration following overexposure. Increased sensitivity of the heart to adrenaline may be caused by overexposure to this product. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

A. Extinguishing media

Suitable extinguishing media : Use dry chemical, CO₂, water spray (fog) or foam.

Unsuitable extinguishing media : Do not use water jet.

B. Specific hazards arising from the chemical

: Emits toxic fumes under fire conditions. Vapors are heavier than air and may spread along floors. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Vapor concentration in a confined or poorly ventilated area can be ignited upon contact with a high energy spark, flame, or high intensity source of heat. This can occur at concentrations ranging between the upper and lower explosion limits (by volume). In a fire or if heated, a pressure increase will occur and the container may burst. This material is toxic to aquatic life. This material is harmful to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous thermal decomposition products : Depending on conditions, decomposition products may include the following materials:
carbon oxides
halogenated compounds
carbonyl halides

When this product is involved in fires, it can decompose to hydrogen chloride and possible traces of phosgene.

C. Special equipment for fire-fighting

: Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Fire-fighting procedures : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Section 6. Accidental release measures

A. Personal precautions, protective equipment and emergency procedures : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Stay upwind/keep distance from source. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

B. Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. Toxic to aquatic life with long lasting effects. Dike spill area and do not allow product to reach sewage system or surface or ground water. Notify any reportable spill to authorities. (See section 12 for environmental risks and 13 for disposal information.)

Avoid contamination of water supplies. Handling, storage and use procedures must be carefully monitored to avoid spills or leaks. Any spill or leak has the potential to cause underground water contamination which may, if sufficiently severe, render a drinking water source unfit for human consumption. Contamination that does occur cannot be easily corrected. If area of spill is porous, remove as much earth and gravel, etc. as necessary and place in closed containers for disposal.

C. Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Eliminate all ignition sources. Move containers from spill area. Absorb spill with inert material (e.g. dry sand or earth) and place in a chemical waste container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Eliminate all ignition sources. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

A. Precautions for safe handling : Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Avoid exposure - obtain special instructions before use. Do not get in eyes or on skin or clothing. Do not swallow. Do not breathe vapor or mist. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Take precautionary measures against electrostatic discharges. Vapors are heavier than air and may spread along floors. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding

Section 7. Handling and storage

containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container.

This material or its vapors when in contact with flames, hot glowing surfaces or electric arcs can decompose to form hydrogen chloride gas and possible traces of phosgene. Do not use cutting or welding torches on drums that contained this product unless properly purged and cleaned. Do not ship lightly stabilized grades in aluminum trailers.

B. Conditions for safe storage, including any incompatibilities

- Do not store above the following temperature: 35°C (95°F). Do not store or stack aluminum in contact with this product to prevent possible solvent decomposition (stacking corrosion). Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Keep away from incompatible materials. Liquid oxygen or other strong oxidants may form explosive mixtures with this product. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

A. Occupational exposure limits

Ingredient name	Exposure limits
Trichloroethylene	Ministry of Labor (Republic of Korea, 3/2012). STEL: 1080 mg/m ³ 15 minutes. STEL: 200 ppm 15 minutes. TWA: 270 mg/m ³ 8 hours. TWA: 50 ppm 8 hours.

Recommended monitoring procedures

- If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to appropriate monitoring standards. Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

B. Appropriate engineering controls

- Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Environmental exposure controls

- Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

C. Personal protective equipment

Respiratory protection :

Section 8. Exposure controls/personal protection

Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. If workers are exposed to concentrations above the exposure limit, they must use appropriate, certified respirators. Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary.

- Eye protection** : Chemical splash goggles.
- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Gloves** : Impervious gloves. Viton®. Silver Shield® gloves. Polyvinyl alcohol (degrades in water).
- Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Section 9. Physical and chemical properties

- A. Appearance**
- Physical state** : Liquid.
- Color** : Colorless.
- B. Odor** : Ethereal.
- C. Odor threshold** : Not available.
- D. pH** : 6 to 7.4
- E. Melting/freezing point** : -86.4°C (-123.5°F)
- F. Boiling point/boiling range** : 86.4 to 87.5°C (187.5 to 189.5°F)
- G. Flash point** : None (by DOT test method).
- H. Evaporation rate** : 0.28 (ether (anhydrous) = 1)
- I. Flammability (solid, gas)** : Not available.
- J. Lower and upper explosive (flammable) limits** : Lower: 7.8%
Upper: 52%
- K. Vapor pressure** : 7.7 kPa (57.8 mm Hg) [20°C]
- L. Solubility** : 0.11 % at 20°C
- M. Vapor density** : 4.54 [Air = 1]
- N. Relative density** : 1.46 to 1.47 [at 20°C]

Section 9. Physical and chemical properties

- O. Partition coefficient: n-octanol/water** : 2.42
- P. Auto-ignition temperature** : 420°C (788°F)
- Q. Decomposition temperature** : Not available.
- R. Viscosity** : 0.55 cP 25 °C
- S. Molecular weight** : 131.39

Section 10. Stability and reactivity

- A. Chemical stability** : Stable under recommended storage and handling conditions (see Section 7).
- Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.
- Under normal conditions of storage and use, hazardous polymerization will not occur.
- B. Conditions to avoid** : Keep away from ignition sources such as heat/sparks/open flame. - No smoking. When exposed to high temperatures may produce hazardous decomposition products.
- When this product is involved in fires, it can decompose to hydrogen chloride and possible traces of phosgene.
- C. Incompatible materials** : Keep away from the following materials to prevent strong exothermic reactions: oxidizing agents, strong alkalis, strong acids. Avoid contamination with caustic soda, caustic potash or oxidizing materials. Shock sensitive compounds may be formed.
- D. Hazardous decomposition products** : Depending on conditions, decomposition products may include the following materials: carbon monoxide, carbon dioxide, Hydrogen chloride (HCl). Phosgene gas.

Section 11. Toxicological information

- A. Information on the likely routes of exposure** : Inhalation. Skin contact. Eye contact. Ingestion.
- Potential acute health effects**
- Inhalation** : May be harmful if inhaled. Irritating to respiratory system. Can irritate eyes, nose, mouth and throat. Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
- Ingestion** : May be harmful if swallowed. Can cause central nervous system (CNS) depression. Aspiration hazard if swallowed. Can enter lungs and cause damage. Irritating to mouth, throat and stomach.
- Skin contact** : Causes skin irritation. Defatting to the skin.
- Eye contact** : Causes serious eye irritation.
- Over-exposure signs/symptoms**
- Inhalation** :

Section 11. Toxicological information

Adverse symptoms may include the following:

irritation
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness
death

Ingestion : Adverse symptoms may include the following:
irritation
nausea or vomiting
headache
dizziness/vertigo
unconsciousness
Aspiration hazard if swallowed.
pulmonary edema
chemical pneumonitis

Skin contact : Adverse symptoms may include the following:
irritation
redness
dryness
cracking

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

B. Health hazards

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Trichloroethylene	LC50 Inhalation Vapor	Rat	140700 mg/m ³	1 hours
	LD50 Dermal	Rabbit	>20 g/kg	-
	LD50 Oral	Rat	4920 mg/kg	-

Conclusion/Summary : May be harmful if swallowed or if inhaled. Aspiration hazard if swallowed. Can enter lungs and cause damage. Can cause central nervous system (CNS) depression.

Irritation/Corrosion

Conclusion/Summary

Skin : Causes skin irritation.
Eyes : Causes serious eye irritation.
Respiratory : Irritating to respiratory system.

Sensitization

Conclusion/Summary

Skin : In a guinea pig maximization test, trichloroethylene was shown to produce skin sensitization. However, there is no evidence that trichloroethylene is a human skin sensitizer as sensitization has not been observed in workers in the occupational environment with many years of use.

Respiratory : Not available.

GERM CELL MUTAGENICITY

Not available.

Section 11. Toxicological information

Conclusion/Summary : When activated with microsomal enzymes, trichloroethylene has been shown to be weakly positive in certain microbial mutagen test systems.

Carcinogenicity

Not available.

Conclusion/Summary : Chronic exposure to trichloroethylene primarily produced renal toxicity and tumors in rats and liver and lung tumors in mice, with some reports of tumors at other sites.

Extensive epidemiologic cohort studies of Trichloroethylene-exposed workers do not indicate significant increases in cancer incidence, but case-control studies suggest that prolonged exposure to high concentrations of Trichloroethylene can increase the incidence of renal cancer.

Reproductive toxicity

Not available.

Conclusion/Summary : Trichloroethylene has not been shown to produce female reproductive toxicity. Damage to the epididymis and sperm integrity has been observed in male mice exposed to high levels of trichloroethylene (≥ 1000 ppm); however, there is very limited evidence existing for any male reproductive effect in rats or humans.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Name	Result
TRICHLOROETHYLENE	Applicable

Potential chronic health effects

Chronic toxicity

Conclusion/Summary : Prolonged exposure may result in liver and kidney damage as well as immunological effects. One immunological effect that has been reported in several studies linked occupational trichloroethylene exposure to a rare but severe immunological skin disorder and accompanying hepatitis (such as Stevens-Johnson syndrome) especially in people of Asian descent. The clinical features associated with these disorders include generalized severe dermatitis and shedding of the skin, fever, abnormal liver function, jaundice, and sometimes death due to liver failure and infection. The science involved in the understanding of this association between exposure to trichloroethylene and these severe immunological skin disorders is ongoing. Loss of auditory function (hearing loss) has also been observed in laboratory animals at high trichloroethylene exposure concentrations (≥ 2000 ppm). Prudent handling practices should be followed to minimize human exposure.

General : May cause damage to organs through prolonged or repeated exposure. Prolonged or repeated contact can defat the skin and lead to irritation, cracking and/or dermatitis.

Carcinogenicity : Can cause cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : Suspected of causing genetic defects.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Section 11. Toxicological information

ATE value

Not available.

Section 12. Ecological information

A. Ecotoxicity

Product/ingredient name	Result	Species	Exposure
Trichloroethylene	Acute EC50 36.5 mg/l Fresh water	Algae - Chlamydomonas reinhardtii - Exponential growth phase	72 hours
	Acute EC50 390000 µg/l Fresh water	Algae - Selenastrum sp.	96 hours
	Acute LC50 30000 µg/l Fresh water	Crustaceans - Asellus aquaticus	48 hours
	Acute LC50 39000 µg/l Fresh water	Daphnia - Daphnia pulex	48 hours
	Acute LC50 3100 µg/l Fresh water	Fish - Jordanella floridae - Juvenile (Fledgling, Hatchling, Weanling)	96 hours
	Chronic NOEC 2200 µg/l Fresh water	Daphnia - Daphnia magna	48 hours

Conclusion/Summary : Toxic to aquatic life. Harmful to aquatic life with long lasting effects.

B. Persistence and degradability

Conclusion/Summary : According to EC criteria: Not expected to be readily biodegradable

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Trichloroethylene	-	50%; 7 day(s)	Not readily

C. Bioaccumulative potential

Product/ingredient name	LogP _{ow}	BCF	Potential
Trichloroethylene	2.42	The BCF for Trichloroethylene (79-01-6) ranged from 4.3, 17, 39 and up to 302, in carp, bluegill sunfish, rainbow trout, and green algae respectively.	low

D. Mobility in soil

Soil/water partition coefficient (K_{oc}) : 72 to 180

E. Other adverse effects : Do not allow to enter drains or watercourses.

Section 13. Disposal considerations

- A. Disposal methods** : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor.
- B. Disposal precautions** : This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	UN	IMDG	IATA
A. UN number	1710	1710	1710
B. Proper shipping name	TRICHLOROETHYLENE	TRICHLOROETHYLENE	TRICHLOROETHYLENE
C. Transport hazard class(es)	6.1	6.1	6.1
D. Packing group	III	III	III
E. Marine pollutant	No.	No.	No.
F. Special precautions for user	Do not ship lightly stabilized grades in aluminum trailers.	Do not ship lightly stabilized grades in aluminum trailers.	Do not ship lightly stabilized grades in aluminum trailers.
G. Additional information	-	-	-

Section 15. Regulatory information

A. Regulation according to ISHA

- ISHA Article 37** : The following components are listed: Trichloroethylene
- ISHA Article 38** : None of the components are listed.
- Exposure Limit of Chemical Substances Public Notice No. 2011-13** : Occupational exposure limits, if available, are listed in Section 8.

B. Regulation according to TCCA

- Korea inventory** : All components are listed or exempted.
- TCCA Toxic chemicals** : Toxic
- TCCA Observational chemicals** : None of the components are listed.

Section 15. Regulatory information

- TCCA Article 32 (Banned)** : None of the components are listed.
- TCCA Article 32 (Restricted)** : The following components are listed: Trichloroethylene
- TCCA Article 17 (TRI)** : The following components are listed: Trichloroethylene
- C. Dangerous Materials Control Act** : Not regulated
- D. Wastes regulation** : Dispose of contents and container in accordance with all local, regional, national and international regulations.
- E. Regulation according to other foreign laws**
- Safety, health and environmental regulations specific for the product** : No known specific national and/or regional regulations applicable to this product (including its ingredients).
- Australia inventory (AICS)** : All components are listed or exempted.
- Canada inventory (DSL)** : All components are listed or exempted.
- China inventory (IECSC)** : All components are listed or exempted.
- Europe inventory (REACH)** : Please contact your supplier for information on the inventory status of this material.)
- Japan inventory (ENCS)** : All components are listed or exempted.
- New Zealand (NZIoC)** : All components are listed or exempted.
- Philippines inventory (PICCS)** : All components are listed or exempted.
- United States inventory (TSCA 8b)** : All components are listed or exempted.

Section 16. Other information

- A. References** : Korean Ministry of Environment; Toxic Chemicals Control Act (TCCA)
Korean Ministry of Labor; Industrial Safety and Health Act
NIER Notice 2010-4
Registry of Toxic Effects of Chemical Substances (RTECS)
U.S. Environmental Protection Agency, AQUIRE (Aquatic toxicity Information Retrieval) ECOTOX Database System.
- B. Date of issue/Date of revision** : 10/26/2013.
- C. Version** : 1
- Prepared by** : EHS
- D. Other**

 Indicates information that has changed from previously issued version.

Disclaimer

The information contained in this data sheet is based on present scientific and technical knowledge. The purpose of this information is to draw attention to the health and safety aspects concerning the products supplied by Axiall, LLC; and to recommend precautionary measures for the storage and handling of the products. No warranty or guarantee is given in respect of the properties of the products. No liability can be accepted for any failure to observe the precautionary measures described in this data sheet or for any misuse of the products.