

SAFETY DATA SHEET

Date Printed : January 7, 2020

Version : 4th

Regulation : According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

1. Identification

1.1 Product identifier

1.1.1 Product name: EDC

1.1.2 Other means of identification: Ethylene dichloride

1.2 Recommended use of the chemical and restrictions on use

1.2.1 Recommended use: EDC is primarily used in the manufacture of VCM. Also It used as trichloroethane, organic solvent.

1.2.2. Restrictions on use : Do not use for purposes other than those recommended.

1.3 Details of the supplier of the safety data sheet

1.3.1 Manufacturer

Company name: Hanwha Solutions Co, Ltd.

Address: Yeosu plant, Hanwha Solutions Co, Ltd., 117, Yeosusandan 3-ro, Yeosu-si, Jeollanam-do, Korea
Ulsan plant, Hanwha Solutions Co, Ltd., 141, Sanggae-ro, Nam-gu, Ulsan, Korea

Prepared by: VCM Production Team

Contact Telephone (Yeosu plant) +82-61-688-1724

(Ulsan plant)+82-52-279-2323

1.3.2 Supplier & Distributor

Company name: Hanwha Solutions Co, Ltd.

Address: 21F, Hanwha Bldg., Janggyo-dong, Jung-gu, Seoul, Korea

Prepared by: CA Overseas Sales Team

Contact Telephone: +82-10-3033-8502

1.4 Emergency phone number

Emergency phone: +82-10-3033-8502

2. Hazard(s) identification

2.1 Classification of the substance or mixture

According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

Physical / Chemical Hazards:

Flammable liquids : Category 2

Health Hazards:

Acute toxicity (oral) : Category 4

Skin corrosion/irritation : Category 2

Serious eye damage /eye irritation : Category 2A

Carcinogenicity : Category 1B

Specific target organ toxicity (single exposure) : Category 3 (respiratory tract irritation)

Environmental Hazards:

Not classified

2.2 Label elements, including precautionary statements

o Pictogram and symbol:



o Signal word: Danger

o Hazard statements:

- H225 Highly flammable liquid and vapour
- H302 Harmful if swallowed.
- H315 Causes skin irritation.
- H319 Causes serious eye irritation
- H335 May cause respiratory irritation.
- H350 May cause cancer.

o Precautionary statements:

- P201 Obtain special instructions before use.
- P202 Do not handle until all safety precautions have been read and understood.
- P210 Keep away from heat/sparks/open flames/... /hot surfaces.... No smoking.
- P233 Keep container tightly closed.
- P240 Ground/bond container and receiving equipment.
- P241 Use explosion-proof electrical/ventilating/lighting equipment.
- P242 Use only non-sparking tools.
- P243 Take precautionary measures against static discharge.
- P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
- P264 Wash thoroughly after handling.
- P270 Do not eat, drink or smoke when using this product.
- P271 Use only outdoors or in a well-ventilated area.
- P280 Wear protective gloves/protective clothing/eye protection/face protection.
- P281 Use personal protective equipment as required.

o Treatment statements:

- P301+P312 If swallowed: Call a poison center or doctor/physician if you feel unwell.
- P302+P352 If on skin: Wash with plenty of soap and water.
- P303+P361+P353 If on skin (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
- P304+P340 If inhaled: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses,
if present and easy to do. Continue rinsing.
- P308+P313 IF exposed or concerned: Get medical advice/attention.
- P312 Call a poison center or doctor/physician you feel unwell.
- P321 Specific treatment (see information on this label).
- P330 Rinse mouth.
- P332+P313 If skin irritation occurs: Get medical advice/ attention.
- P337+P313 If eye irritation persists: Get medical advice/attention.
- P362 Take off contaminated clothing and wash before reuse.
- P370+P378 In case of fire: Use CO₂ for extinction.

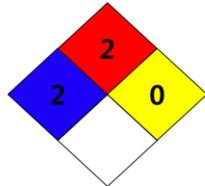
o Storage statements:

- P403+P233 Store in a well-ventilated place. Keep container tightly closed.
- P403+P235 Store in a well-ventilated place. Keep cool.
- P405 Store locked up.

o Waste statements:

P501 Dispose the contents/container in accordance with local/regional/national/international regulations.

2.3 Other hazard information not included in hazard classification (NFPA)



- o Health: 2
- o Flammability: 2
- o Reactivity: 0
- o Specific hazard: -

3. Composition/information on ingredients

Component	Common name and synonyms	CAS No.	Conc. / %
Ethylene dichloride	1,2-Dichlorethane	107-06-2	100

4. First aid measures

4.1 Description of first aid measures

Eye contact

- Get immediate medical advice/attention.
- In case of contact with substance, immediately flush eyes with running water at least 20 minutes.

Skin contact

- Get immediate medical advice/attention.
- Remove and isolate contaminated clothing and shoes.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- Wash skin with soap and water.
- If on skin (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
- If skin irritation/erythema persists: Get medical advice/attention.

Inhalation

- If exposed to excessive levels of dusts or fumes, remove to fresh air and get medical attention if cough or other symptoms develop.
- Give artificial respiration if victim is not breathing.
- If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.
- Administer oxygen if breathing is difficult.
- Get immediate medical advice/attention.

Ingestion

- If exposed or concerned: Get medical advice/ attention.
- Rinse mouth.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms and effect :

Inhalation: Not available

Skin contact: Mild to severe edema and mild to pronounced erythema with or without peripheral and/or superficial necrosis reported.

Lesions include epidermal ulceration/necrosis.

Eye contact: Eye contact may have slight to severe effects.

4.3 Indication of immediate medical attention and notes for physician

- Effects of contact or inhalation may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

5. Fire-fighting measures

5.1 Extinguishing media

- **Suitable extinguishing media:** Use Dry chemical, CO₂, water spray or alcohol-resistant foam.
- **Unsuitable extinguishing media:** straight streams

5.2 Specific hazards arising from the chemical

- Thermal decomposition products: Irritating, Corrosive and/or Toxic gases, Phosgene, Halogenated compounds, Oxides of carbon
- HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Runoff to sewer may create fire or explosion hazard.

5.3 Special protective equipment and precautions for fire-fighters

- Rescuers should put on appropriate protective gear.
- Evacuate area and fight fire from a safe distance.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas
- Dike fire-control water for later disposal; do not scatter the material.
- Fire involving Tanks; Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Fire involving Tanks; Cool containers with flooding quantities of water until well after fire is out.
- Fire involving Tanks; Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- Fire involving Tanks; Always stay away from tanks engulfed in fire.
- Fire involving Tanks; For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.
- Wear positive pressure self-contained breathing apparatus (SCBA).

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

- The very fine particles may cause a fire or explosion, eliminate all ignition sources.
- Clean up spills immediately, observing precautions in Protective Equipment section.
- Isolate hazard area.
- Keep unnecessary and unprotected personnel from entering.
- Do not touch or walk through spilled material.

- Eliminate all ignition sources.
- All equipment used when handling the product must be grounded.
- A vapor suppressing foam may be used to reduce vapors.
- Please note that there are materials and conditions to avoid.
- Avoid breathing dust/fume/gas/mist/vapours/spray.

6.2 Environmental precautions

- Prevent entry into waterways, sewers, basements of confined areas.

6.3 Methods and materials for containment and cleaning up

- Dike and collect water used to fight fire.
- Absorb spills with inert material (e.g., dry sand or earth), then place in a chemical waste container.
- Absorb the liquid and scrub the area with detergent and water.
- Large Spill; Dike far ahead of liquid spill for later disposal.
- Use clean non-sparking tools to collect absorbed material.

7. Handling and storage

7.1 Precautions for safe handling

- Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition.
- Follow all MSDS/label precautions even after container is emptied because they may retain product residues.
- Loosen closure cautiously before opening.
- Avoid prolonged or repeated contact with skin.
- All equipment used when handling the product must be grounded.
- You need measurement of air concentration and ventilation in low, closed and confined areas due to lack of oxygen.
- Do not handle until all safety precautions have been read and understood.
- Use explosion-proof electrical/ventilating/lighting equipment.
- Use only non-sparking tools.
- Take precautionary measures against static discharge.
- Avoid breathing dust/fume/gas/mist/vapours/spray.
- Wash thoroughly after handling.
- Do not eat, drink or smoke when using this product.
- Use only outdoors or in a well-ventilated area.

7.2 Conditions for safe storage, including any incompatibilities

- Empty drums should be completely drained, properly bunged, and promptly returned to a drum reconditioner, or properly disposed of.
- Keep away from food and drinking water.
- Please note that materials and conditions to avoid.
- Store in a well-ventilated place. Keep container tightly closed.
- Keep cool.

8. Exposure controls/personal protection

Occupational Exposure limits

- o **ACGIH:** TWA=10ppm
- o **Biological exposure index:** Not available
- o **OSHA:** TWA=1ppm(4mg/m³), STEL=2ppm (8mg/m³), Ceiling=100ppm
- o **NIOSH:** TWA=1ppm(4mg/m³), STEL=2ppm (8mg/m³)
- o **EU regulation:**
 - Austria: TWA=5ppm (20mg/m³), STEL=20ppm (80mg/m³)
 - Belgium: TWA=10ppm (41mg/m³)
 - Bulgaria: TWA=4mg/m³, STEL=8mg/m³
- o **Other:**
 - Argentina: TWA=10ppm
 - Australia: TWA=10ppm (40mg/m³)
 - Bahrain: TWA= 10ppm (40mg/m³)

8.2 Exposure controls

Appropriate engineering controls

- Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.
- If user operations generate dust, fume, or mist, use ventilation to keep exposure to airborne contaminants below the recommended exposure limit.
- Facilities for storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

Individual protection measures, such as personal protective equipment

Respiratory protection

- Wear NIOSH or approved full or half face piece (with goggles) respiratory protective equipment when necessary.

Eye protection

- Wear breathable safety goggles to protect from particulate material causing eye irritation or other disorder.

Hand protection

- Wear appropriate protective gloves by considering physical and chemical properties of chemicals.

Body protection

- Wear appropriate protective clothing by considering physical and chemical properties of chemicals.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance

Description :	Viscous liquid
Color :	Colorless
Odor :	Sweet odor
Odor threshold :	Not available
pH :	Not available
Melting point/freezing point :	-35.5°C~-36°C
Initial boiling point and boiling range :	83.5°C~84.1°C
Flash point :	13°C
Evaporation rate :	Not available
Flammability (solid, gas) :	Not applicable

Upper/lower flammability or explosive limits :	UEL 16%/LEL 6.2%
Vapor pressure :	81.3 hPa at 20°C
Vapor density :	Not available
Solubility :	8490 – 9000 mg/l at 20°C
Solubility in organic solvents :	Not available
Partition coefficient: n-octanol/water :	logKow=1.45
Auto ignition temperature :	413°C
Decomposition temperature :	Not available
Viscosity :	0.84 cP at 20°C

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

10. Stability and reactivity

10.1 Reactivity/Chemical stability/Possibility of hazardous reactions:

- Stable under normal temperatures and pressures.
- No dangerous reaction known under conditions of normal use.

10.2 Conditions to avoid:

- Avoid heat, sparks, flames and other sources of ignition.
- Avoid contact with plastic.
- Containers may explode when heated.

10.3 Incompatible materials:

- metals, bases, amines, oxidizing agents, combustible materials

10.4 Hazardous decomposition products:

- Irritating, corrosive and/or toxic gases, phosgene, halogen compounds, carbon compounds

11. Toxicological information

Information on toxicological effects	
(a) Acute toxicity	Acute(Oral)-Category 4
Oral	Rabbit, LD ₅₀ =910 mg/kg bw
Dermal	Rabbit, LD ₅₀ =4,890 mg/kg bw
Inhalation	Rat, LC ₅₀ =7,758 mg/m ³ /4h (OECD TG 403)
(b) Skin Corrosion/ Irritation	Category 2 In test on skin corrosion/irritation with rabbits, moderately skin irritations were observed. (PII:4.7)
(c) Serious Eye	Category 2A

Damage/ Irritation	In eye irritation test with rabbits, In another Slight reddening in 2/6 animals as well as annular conjunctival swelling in one animal was observable. All symptoms were reported to have disappeared completely within three days
(d) Respiratory sensitization	Not available
(e) Skin Sensitization	Not classified
	Under the experimental conditions of this study, the test item, 1,2-DICHLOROETHANE, did not induce delayed contact hypersensitivity in the murine Local Lymph Node Assay. (OECD TG 429, GLP)
(f) Carcinogenicity	Category 1B
	<ul style="list-style-type: none"> - EU CLP: Carc. 1B (May cause cancer) - ACGIH: A4 (Not Classifiable as a Human Carcinogen) - IARC: Group 2B (Possible Human Carcinogen) - NTP: Reasonably Anticipated To Be A Human Carcinogen
(g) Mutagenicity	Not classified
	In vitro: Mammalian cell gene mutation assay (<i>S. typhimurium</i>) with/ without metabolic activation: Positive In vitro: Chromosome Aberration Test (<i>CHL cells</i>) with metabolic activation: Positive/ without metabolic activation: Negative
	In vitro: UDS test (<i>Primary rat hepatocytes NMRI mouse</i>) without metabolic activation: Positive In vivo: Micronucleus test (<i>Mouse bone-marrow cells</i>) : with/ without metabolic activation: Positive at 1 mg/kg bw and above
(h) Reproductive toxicity	Not classified
	No maternal deaths and no signs of toxicity observed in rats at 100 ppm. Maternal body weight was significantly increased compared to controls. Severe maternal toxicity was seen in rats at 300 ppm. Lethargy, ataxia, decreased body weights and food intake, some vaginal bleeding was seen prior to deaths in 10/16 dams. (OECD TG 414)
(i) Specific target organ toxicity (single exposure)	Category 3 (Respiratory tract irritation)
	In gavage study with rat, (500, 630, 795, and 1000 mg/kg) The gross pathology noted at autopsy included congestion of the lungs, pale kidney and livers, and injection of blood vessels in the intestines. Deaths occurred within 24 h to 3d after dosing, in one case after 5 d.
(j) Specific target organ toxicity (repeat exposure)	Not classified
	In test on repeated Dose Toxicity/Fertility study with rat, (2yr, 250, 500 ppm) No effects on food consumption, body weight development or on liver and kidney function reported. The following serum level remained unaffected at the end of the experiment. (NOAEL=500ppm)
(k) Aspiration Hazard	Not available

12. Ecological information

12.1 Toxicity	Not classified
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Acute toxicity	<p>Fish: 96hr LC₅₀ (<i>Micropterus salmoides</i>)=66mg/L(static, analysis) 96hr LC₅₀ (<i>Limanda limanda</i>)=115mg/L(flow-through, analysis) 32d NOECs (<i>Pimephales</i>)=29mg/L</p> <p>Crustacean: 48hr LC₅₀ (<i>Eliminius modestus</i>)= 186 mg/L(closed system) 28d NOEC (<i>Daphnia magna</i>)=11mg/L(closed system)</p> <p>Algae: 72hr EC₅₀ (<i>Scenedesmus subspicatus</i>) =189mg/L (closed system)(OECD TG 201)</p>
Chronic toxicity	<p>Fish: 32d NOECs (<i>Pimephales</i>)=29mg/L Crustacean: 28d NOEC (<i>Daphnia magna</i>)=11mg/L Algae: Not available</p>
12.2 Persistence and degradability	<p>Persistence: Low persistency (log Kow is more than 4 estimated.) Log Kow =1.45 Degradability: Half lifecycle: 20-300 days (at pH 7, 15°C)</p>
12.3 Bioaccumulative potential	<p>Bioaccumulation: Bioaccumulation is expected to be low according to the BCF <500. (BCF = 2.75) Biodegradation: As well-biodegraded, it is expected to have low accumulation potential in living organisms (90% biodegradation was observed with 20 day)</p>
12.4 Mobility in soil	Low potency of mobility to soil. (Koc =19.23)
12.5 Other adverse effects	Not available

13. Disposal considerations

13.1 Disposal method

- Waste must be disposed of in accordance with federal, state and local environmental control regulations.
- Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility.
- Dispose of container and unused contents in accordance with federal, state and local requirements.

13.2 Disposal precaution

Consider the required attentions in accordance with waste treatment management regulation.

14. Transport information

14.1 UN No. : 1184

14.2 UN Proper shipping name: ETHYLENE DICHLORIDE

14.3 Transport Hazard class

ADR: 3/6.1

IMDG: 3/6.1

ICAO/IATA: 3/6.1

RID: 3/6.1

14.4 Packing group: II

14.5 Environmental hazards:

Marine pollutant: Not applicable

14.6 Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code): Not established

14.7 Special precautions for user

in case of fire: F-E

in case of leakage: S-D

15. Regulatory information**15.1 Safety, health and environmental regulation/legislation specific for the substance or mixture USA
Regulatory Information**

TSCA (Toxic Substances Control Act): Section 8(b) inventory (Present) [T]

Proposition 65: Not regulated

OSHA Regulation: Not regulated

CERCLA Regulation: 100 lb, 45.4kg

SARA 311/312 Hazard classes: Acute Health Hazard, Chronic Health Hazard, Fire Hazard

SARA 302 Regulation: Not regulated

SARA 304 Regulation: Not regulated

SARA 313 Regulation: Regulated

Foreign Regulatory Information

Substance of Rotterdame Protocol: Regulated

Substance of Stockholm Protocol: Not regulated

Substance of Montreal Protocol: Not regulated

Foreign Inventory Status

- Korea management information: Existing Chemical Substance (KE-10121),
Phase-in substance subject to registration (239),
Toxic Chemical(2001-1-518)
- European Inventory of Existing Commercial chemical Substances(EINECS): Present (203-458-1)
- Japan management information: Existing and New Chemical Substances (ENCS): Present (2)-54
- China management information: Inventory of Existing Chemical Substances (IECSC): Present (09963)
- Australia management information: Inventory of Chemical Substances (AICS): Present
- Canada management information: Domestic Substances List (DSL): Present
- New Zealand management information: Inventory of Chemicals (NZIoC): HSNO Approval: HSR001152
- Philippines management information: Inventory of Chemicals and Chemical Substances (PICCS): Present

16. OTHER INFORMATION**16.1 Indication of changes:**

Version: 4

Revision date: July 7, 2020

16.2 Key literature reference and sources for data:

- o TSCA; http://iaspub.epa.gov/sor_internet/registry/substreg/searchandretrieve/searchbylist/search.do
- o EU Regulation 1272/2008
- o TOMES;LOLI ; <http://csi.micromedex.com/fraMain.asp?Mnu=0>
- o UN Recommendations on the transport of dangerous goods 17th

- o IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; <http://monographs.iarc.fr>
- o ECHA CHEM; <http://echa.europa.eu/web/guest/information-on-chemicals/registered-substances>
- o OECD SIDS; <http://webnet.oecd.org/Hpv/UI/Search.aspx>
- o HSDB; <http://toxnet.nlm.nih.gov/cgi-bin/sis/search2>
- o EPA; <http://www.epa.gov/iris>
- o NIOSH; [NIOSH.cdc.gov/niosh/npg/npgd0018.html](http://www.cdc.gov/niosh/npg/npgd0018.html)
- o National Emergency Management Agency-Korea dangerous material inventory management system; <http://www.nema.go.kr/hazmat/main/main.jsp>
- o Waste Control Act enforcement regulation attached [1]

16.3 Abbreviations

- ACGIH: American Conference of Governmental Industrial hygienists
- NIOSH: The National Institute for Occupational Safety and Health
- OSHA: Occupational Safety & Health Administration
- IARC: International Agency for Research on Cancer
- ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
- IMDG: International Maritime Dangerous Goods
- ICAO/IATA: International Civil Aviation Organization/ International Air Transport Association
- RID: Regulations Concerning the International Transport of Dangerous Goods by Rail

16.4 Other

- Product should be handled, stored, and used in accordance with the generally accepted industrial hygiene practices and in conformity with all the applicable legal regulations.
- The information provided herein is based on the knowledge possessed at this present time from the view point of safety requirements.
- It should, therefore, not be construed as guaranteeing specific properties.