

SAFETY DATA SHEET

Date Printed: January 7, 2020

Version: 6th

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

1. Identification

1.1 Product identifier

1.1.1 Product of name: Hydrochloric Acid (35%)

1.1.2 Other means of identification: Hydrogen Chloride, Aqueous

1.2 Recommended use of the chemical and restrictions on use

1.2.1 Recommended use: It is also used for catalyst and solvent of food industry, waste water treatment and organic synthesis

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

TDI plant, Hanwha Solutions Co, Ltd., 46-47, Yeosusandan 2-ro, Yeosu-si, Jeollanam-do, Korea

Prepared by: VCM Production Team, ECH Production Team, CA Production Team, TDI Production Team

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(Ulsan plant) +82-52-279-2323, +82-52-279-2303

(TDI plant) +82-61-688-4863

1.3.2 Supplier & Distributor

Company name: Hanwha Solutions Co, Ltd.

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

Prepared by: CA Domestic Sales Team

Contact Telephone: +82-10-9772-2753

1.4 Emergency phone number

Emergency phone: +82-10-9772-2753

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:

Not Classified

Health Hazards:

Skin corrosion/irritation: Category 1

Serious eye damage/eye irritation, Category 1

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

Environmental Hazards:

Hazardous to the aquatic environment: Chronic, Category 2

2.2 Label elements, including precautionary statements

o Pictogram and symbol:



o Signal word: Danger

o Hazard statements:

- H314 Causes severe skin burns and eye damage.
- H318 Causes serious eye damage.
- H335 cause respiratory irritation.
- H411 Toxic to aquatic life with long lasting effects

o Precautionary statements:

- Prevention:

- P260 Do not breathe dust/fume/gas/mist/vapours/spray.
- P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
- P264 Wash your hands thoroughly after handling.
- P271 Use only outdoors or in a well-ventilated area
- P273 Avoid release to the environment.
- P280 Wear protective gloves/protective clothing/eye protection/face protection.

- Treatment:

- P301+P330+P331 If swallowed: Rinse mouth. Do not induce vomiting.
- 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.
- P310 Immediately call a poison center or doctor/physician.
- P312 Call a poison center or doctor/physician you feel unwell.
- P321 Specific treatment (see ... on this label).
- P363 Wash contaminated clothing before reuse.
- P391 Collect spillage.

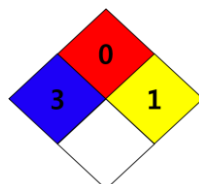
- Storage:

- P403+P223 Store in a well-ventilated place. Keep container tightly closed.
- P405 Store locked up.

- Disposal:

- 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: 3
- o Flammability: 0
- o Reactivity: 1

3. Composition/information on ingredients

Component	Common name and synonyms	CAS No.	Conc. / %
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Hydrogen Chloride	Chlorohydric acid	7647-01-0	34.5 ~ 35.5
Water	Dihydrogen oxide	7732-18-5	64.5 ~ 65.5

4. First-aid measures

4.1 Description of first aid measures

Eye contact

- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- Call emergency medical service.

Skin contact

- If skin irritation occurs: Get medical advice/ attention.
- Call a poison center or doctor/physician you feel unwell.
- For hot product, immediately immerse in or flush the affected area with large amounts of cold water to dissipate heat.
- Call emergency medical service.
- Remove and isolate contaminated clothing and shoes.

Inhalation

- If exposed to excessive levels of dusts or fumes, remove to fresh air and get medical attention if cough or other symptoms develop.
- Immediately call a poison center or doctor/physician.

Ingestion

- If swallowed: Immediately call a poison center or doctor/physician.
- If swallowed: Rinse mouth. Do not induce vomiting.
- Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

4.2 Most important symptoms and effects, both acute and delayed

- Inhalation: May cause respiratory irritation.
- Skin contact: May cause severe skin irritation.
- Eye contact: May cause severe eye irritation.

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.
- Keep victim under observation.

5. Fire-fighting measures

5.1 Extinguishing media

- Suitable extinguishing media

- Use alcohol foam, carbon dioxide when fighting fires involving this material.
- Use dry sand or earth to smother fire.

- Unsuitable extinguishing media: Not available

5.2 Specific hazards arising from the chemical

- Do not direct water at spill or source of leak.
- Material may produce irritating and highly toxic gases from decomposition by heat and combustion during burning.
- Containers may explode when heated.
- Some of these materials may burn, but none ignite readily.
- In contact with metal may release flammable hydrogen gases.
- Some are toxic and may be fatal if inhaled, swallowed or absorbed through skin.
- Vapors are extremely irritating and corrosive.

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.
- Vapors from liquefied gas are initially heavier than air and spread along ground.
- Ruptured cylinders may rocket.
- Move containers from fire area if you can do it without risk.
- Fire involving Tanks; Do not direct water at source of leak or safety devices; icing may occur.
- Fire involving Tanks; Always stay away from tanks engulfed in fire.
- 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.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

- Avoid breathing dust/fume/gas/mist/vapours/spray.
- Clean up spills immediately, observing precautions in Protective Equipment section.
- Stop leak if you can do it without risk.
- If possible, turn leaking containers so that gas escapes rather than liquid.
- Isolate area until gas has dispersed.
- Do not touch or walk through spilled material.
- Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
- Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire.
- Please note that there are materials and conditions to avoid.

6.2 Environmental precautions

- Atmosphere: Not available
- Land: Not available
- Underwater: Prevent entry into waterways, sewers, basements of confined areas.
Runoff from fire control may be corrosive and/or toxic and cause pollution.
Avoid release to the environment.

6.3 Methods and materials for containment and cleaning up

- Corrosive liquid. Absorb with DRY earth, sand or other non-combustible material. Use water spray to reduce vapors. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.

7. Handling and storage

7.1 Precautions for safe handling

- Avoid breathing dust/fume/gas/mist/vapours/spray.
- Wash your hands thoroughly after handling.
- Use only outdoors or in a well-ventilated area.
- Follow all MSDS/label precautions even after container is emptied because they may retain product residues.
- Loosen closure cautiously before opening.
- Avoid breathing vapors from heated material.
- Please note that there are materials and conditions to avoid.
- Please work with reference to engineering controls and personal protective equipment.

7.2 Conditions for safe storage, including any incompatibilities

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

8. Exposure controls/personal protection

8.1 Occupational Exposure limits

- o **ACGIH regulation:** Ceiling=2ppm
- o **Biological exposure index:** Not available
- o **OSHA regulation:** Ceiling=5ppm, 7mg/m³
- o **NIOSH regulation:** Ceiling=5ppm, 7mg/m³
- o **EU regulation:**
 - Italy: TWA=5ppm
 - Ireland: TWA=5ppm
 - Malta: TWA=5ppm, STEL=10ppm
- o **Other:**
 - Singapore: STEL=5ppm
 - Sri Lanka: TWA= 5ppm
 - Vietnam: TWA=5mg/m³, STEL=7.5mg/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

- If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been

established), an approved respirator must be worn. Air-purifying respirator with an appropriate, government approved (where applicable), air-purifying filter, cartridge or canister. Contact health and safety professional or manufacturer for specific information.

Eye protection

- Wear safety goggles as follow if eye irritation or other disorder occur.
- ; In case of gaseous state organic material: enclosed safety goggles
- ; In case of vapour state organic material: safety goggles or breathable safety goggles
- ; In case of particulate material: breathable safety goggles
- An eye wash unit and safety shower station should be available nearby work place.

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:	Liquid
Color:	Colorless
Odor:	pungent
Odor threshold:	Not available
pH:	Not available
Melting point/freezing point:	-30~-36°C at 1,013hPa
Initial boiling point and boiling range:	61~71°C at 1,013hPa
Flash point:	Not available
Evaporation rate:	Not available
Flammability (solid, gas):	Not flammable
Upper/lower flammability or explosive limits:	Not available
Vapor pressure:	76mmHg(20°C)
Vapor density:	Not available
Relative density:	1.1691~1.1789(water=1, 20°C)
Solubility:	823g/l(0°C), 673g/l(30°C), 561g/l(60°C)
Partition coefficient: n-octanol/water:	Not available
Auto-ignition temperature:	Not auto-ignitable
Decomposition temperature	Not available
Viscosity:	0.405cP(liquid 118.16K), 0.0131cP(vapor 273.06K), 0.0253cP(vapor 523.2K))

“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:

- Contains gas under pressure; may explode if heated.
- May decompose at high temperatures into forming toxic gases.

- Containers may explode when heated.
- Some may react violently with water.
- Some of these materials may burn, but none ignite readily.
- Cylinders exposed to fire may release flammable gas.
- Some are toxic and may be fatal if inhaled, swallowed or absorbed through skin.
- Vapors are extremely irritating and corrosive.

10.2 Conditions to avoid:

- Contains gas under pressure; may explode if heated.
- Prevent entry into sewers, basements or confined areas; dike if needed.

10.3 Incompatible materials:

- Cyanides metals, Amines, Bases, Metal carbide, Strong oxidizing agents, Acids, Halogenated compounds, carbon, Combustible materials, halogens, Metal salts

10.4 Hazardous decomposition products:

- Hydrogen chloride gas, Chlorine gas, Hydrogen gas.
- With strong oxidizer (bleach, H₂O₂, HNO₃, etc.) and fire may release toxic chlorine gases.

11. Toxicological information	
Information on toxicological effects	
(a) Acute toxicity	Not classified
Oral	Rat, LD ₅₀ =238-277 mg/kg (Difficult to apply to classification due to the low reliability.)
Dermal	Rabbit, LD ₅₀ >5,010mg/kg
Inhalation	Rat LC ₅₀ = 45.6 mg/L (39.5~52.8mg/L)/ 4hr (Difficult to apply to classification due to low reliability.)
(b) Skin Corrosion/ Irritation	Category 1 Hydrochloric acid aq. (1h, 4h) at 37% is corrosive to rabbit skin. (OECD TG 404)
(c) Serious Eye Damage/ Irritation	Category 1 Hydrochloric acid may cause severe irritation with corneal injury that may result in permanent impairment of vision. (OECD TG 405)
(d) Respiratory sensitization	Not available
(e) Skin Sensitization	Not classified However, both guinea pig maximization test (1% HCl in EtOH [undefined concentration] was used in both sensitization and challenge phase) and mouse ear swelling test (MEST; 1% HCl in 70% EtOH for sensitization phase, 5% HCl for challenge phase was used) showed negative results (Gad et al., 1986).
(f) Carcinogenicity	Not classified IARC : Group 3 (Not classifiable as to carcinogenicity to human) ACGIH : A4 (Not classifiable as a human carcinogen)

(g) Mutagenicity	Not classified
	<p><i>In vitro</i>: Mammalian cell gene mutation assay (<i>Mouse lymphoma L5178Y cells</i>) with/without metabolic activation: Positive</p> <p><i>In vitro</i>: Mammalian chromosome aberration test (<i>Chinese hamster ovary</i>) with/without metabolic activation: Positive</p> <p><i>In vitro</i>: Mitotic recombination in <i>Saccharomyces cerevisiae</i> (<i>Saccharomyces cerevisiae</i>) with/without metabolic activation : Negative</p> <p><i>In vivo</i>: Not available</p>
(h) Reproductive toxicity	Not classified
	Female rats were mated 12 days after a single exposure of hydrogen chloride vapour (302 ppm, 453 mg/m ³) for 1 hour. Death from severe dyspnea and cyanosis occurred in one third of the dams, functional disorders of the lungs, the kidneys, the liver were observed in surviving dams and offspring, decreased bodyweight was observed in offspring (Pavlova, 1976).
(i) Specific target organ toxicity (single exposure)	Category 3 (respiratory tract irritation)
	Mice were exposed for 10 minutes to concentrations ranging from 0.06 to 1.4mg/L, and dose-response curves were plotted, using the percentage decrease in respiratory rate for each exposure as the reaction reflecting sensory irritation of the upper respiratory tract.
(j) Specific target organ toxicity (repeat exposure)	Not classified
	Daily exposure of mice to gaseous hydrogen chloride at concentrations of 10, 20 and 50 ppm, 6 hours a day, 5 days per week up to a 90 day exposure period affected the body weight of mice of both sexes at the highest dose level. Clinical signs observed were mainly related to the irritant/corrosive properties of HCl as appendage injury (toes missing, swollen, open, gelatinous, scabbed, deformed), alopecia, lip(s) injury (missing, open, lesion, swollen, scabbed), crusty nose, mouth (jaw) injury (open, gelatinous, lesion, scabbed, swollen), poor coat quality, scabbed nose and nasal discharge in mice.
(k) Aspiration Hazard	Not available

12. Ecological information

12.1 Toxicity	Category 2
Acute toxicity	<p>Fish: 96hr LC₅₀ (<i>Lepomis macrochirus</i>)=3.25-3.5mg/L</p> <p>96hr LC₅₀ (<i>Cyprinus carpio</i>)=4.3 mg/l (OECD TG 203)</p> <p>Crustacean: 48hr EC₅₀ (<i>Daphnia magna</i>)=4.92mg/L (OECG TG 202)</p> <p>Algae: 72hr EC₅₀ (<i>Selenastrum capricornutum</i>)=4.7mg/L(OECD TG 201)</p> <p>72hr NOEC=.5mg/l(yield and growth rate)(OECD TG 201)</p>
Chronic toxicity	Not available
12.2 Persistence and degradability	<p>Persistence: Low persistency (log Kow is less than 4 estimated.)</p> <p>(Log Kow = 0.54) (Estimated)</p> <p>Degradability: Not available</p>
12.3 Bioaccumulative potential	<p>Bioaccumulation: Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3.162) (Estimated)</p> <p>Biodegradation: Not available</p>
12.4 Mobility in soil	No potency of mobility to soil. (Koc = 2.939) (Estimated)

12.5 Hazardous to the ozone layer	Not classified
12.6 Other adverse effects	Not available

13. Disposal considerations

Disposal method

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Disposal precaution

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

14. Transport information

14.1 UN No.: 1789

14.2 UN Proper shipping name: HYDROCHLORIC ACID

14.3 Transport Hazard classes

ADR: UN1789, Hydrochloric Acid, 8, pg II
 IMDG: UN1789, Hydrochloric Acid, 8, pg II
 ICAO/IATA: UN1789, Hydrochloric Acid, 8, pg II
 RID: Class 8, Item 5(b), corrosive, Kempler plate: 80/1789

14.4 Packing group: II

14.5 Environmental hazards:

- Marine pollutant: Yes

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-A
in case of leakage: S-B

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: 5,000 lb TQ; 5,000 lb TQ (anhydrous)

CERCLA Regulation: 5,000 lb final RQ; 2,270 kg final RQ

SARA 302 Regulation: 500 lb TP1 (gas only)

SARA 304 Regulation: 5,000 lb EPCRA RQ (gas only)

SARA 313 Regulation: 1.0 % de minimis concentration (acid aerosols including mists, vapors, gas, fog, and other airborne forms of any particle size)

Foreign Regulatory Information

Substance of Rotterdam Protocol: Not regulated

Substance of Stockholm Protocol: Not regulated

Substance of Montreal Protocol: Not regulated

Foreign Inventory Status

- Korea management information: Existing Chemical Substance (KE-20189),
Phase-in substance subject to registration (318),
Accident precaution chemicals,
Toxic Chemical (97-1-203)
- Japan management information: Existing and New Chemical Substances (ENCS): (1)-215
- China management information: Inventory of Existing Chemical Substances (IECSC): Present (37053)
- 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: HSR004090
- Philippines management information: Inventory of Chemicals and Chemical Substances (PICCS): Present

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

16.1 Indication of changes:

Preparation date: June 20, 2016

Version: 6

Revision date: July 15, 2020

16.2 Key literature reference and sources for data:

- o National chemicals information systems; <http://ncis.nier.go.kr>
- o IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; <http://monographs.iarc.fr>
- o ECHA; <http://echa.europa.eu/web/guest>
- o HSDB; <http://toxnet.nlm.nih.gov/>
- o OECD SIDS; <http://webnet.oecd.org/>
- o NIOSH(The National Institute for Occupational Safety and Health)
- o ACGIH(American Conference of Governmental Industrial Hygienists)
- o TOMES-LOLI®; <http://www.rightanswerknowledge.com/loginRA.asp>
- o National Emergency Management Agency-Korea dangerous material inventory management system;
<http://hazmat.mpss.kfi.or.kr/index.do>
- o Waste Control Act enforcement regulation attached [1]
- o EPISUITE Program ver.4.1

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.