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Synonyms : Chlorohydric acid · Hydrochloric acid solution · Hydrogen chloride · Aqueous hydrogen chloride · Muriatic acid · Spirits of salt

CAS No. : 7647-01-0

Ingredient contributing to the hazard(%) : 32%

Section 4 - First Aid Measures

The First-aid Information :

- **Inhalation :**
 1. Remove or clean the substance and moved the patient to ventilated area
 2. If patient cannot breathe, provide CPR; if have difficulties breathing, provide oxygen.
 3. Keep victim warm and at rest.
 4. Seek medical attention immediately
- **Skin Contact :**
 1. Avoid direct contact with the substance. If necessary, wear gloves.
 2. Immediately flush skin with plenty of water for at least 20 – 30 min.
 3. While washing, remove contaminated clothing, shoes and leather crafts.
 4. Thoroughly clean contaminated clothing and shoes before reuse.
 5. Seek medical attention immediately.
- **Eye Contact :**
 1. Immediately flush eyes with plenty of water for at least 20 – 30 min, lifting eyelids occasionally.
 2. Seek medical attention immediately
- **Ingestion :**
 1. If patient is about to lose consciousness or already lost consciousness or having seizures, do not feed anything into the mouth.
 2. Let patient gargle thoroughly using water.
 3. Do not induce vomits.
 4. Let patient drink 240 – 300 ml of water. If have milk, drink it after drinking the water.
 5. If the patient has spontaneous vomits, incline the body to avoid ingest of the vomit. Gargle repeatedly.
 6. Seek medical attention immediately.

The Most Important Symptoms and Hazardous Effects : Highly corrosive and can cause fatal pulmonary edema, caused by burns or even blindness

Protection of First-aiders :

1. Staff without full body chemical-protective suit and mask should not enter the disaster area to carry the injured person
2. Wear class C equipment to do first aid in a safety zone.

Notes to a Physician :

1. Patient, who inhaled the substance, should consider giving oxygen.
2. Avoid gastric lavage or induce vomit

Section 5 - Fire Fighting Measures

Extinguishing Media : This is non-combustible material, select appropriate fire extinguishing



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agent according to the surroundings.
Specific Hazards when Fire-fight : if contact with metal may produce hydrogen.
Specific Fire-fighting Procedure : 1. Spray mist to cool down the containers that are exposed to the fire to avoid explosion. It will reduce or dissipate the vapor/steam. 2. If there is leak, do not spray water mist directly to the source of leak, trained personnel can neutralize the leak.
Specific Protection of Firefighters : To wear full-body chemical-protective suits and air breathing apparatus (if necessary, plus anti-Semitic fire coated aluminum jacket)

Section 6 - Accidental Release Measures

Personal Precautions : 1. Isolate hazard area; keep unnecessary and unprotected personnel from entering until the leaked area is totally cleaned and sanitized. 2. Make sure only the trained personnel is in charge of the clean-up work. Wear appropriate personal protective equipments.
Environmental Precautions : 1. Ventilate the area of leak. 2. Remove all source of ignition 3. Notify Government Safety and Environmental protection unit.
Methods for Cleaning up : 1. Do not touch the leaked substance. 2. Avoid leaked substance into sewer, drainage and confined area. 3. In safety condition, try preventing or reducing the leak. 4. Use sand, soil or other agent that is non-reactive to the material to contain the leakage 5. Small spill : absorb with anything that is non-reactive to the substance. Contaminated absorbed substance and leaked substance are the same harmful. Place them in the container properly sealed and labeled. Use water to flush and clean the leaked area. Small leak can be neutralized or dilute with large volume of water. 6. Large spill : Contact Fire Department, Emergency unit and supplier for help. 7. Use water to rinse the area. Don not allows the water seep into the containers. Large leak may need to spray water mist to prevent/stop the steam/vapor.

Section 7 - Handling and Storage

Handling : 1. Needs project control and protective equipment, staff should be trained and know the danger of the substance and safety usage method. 2. Staff without protective gear should avoid contact with the substance and contaminated equipments. 3. Report immediately to the management if there is leak or inadequate ventilation. 4. Avoid formation of droplet/vapor into the air of the control area. 5. Use minimal amount of the substance during operation and stay as far as possible from the storage area. 6. Operation with large amount of the chemicals should be in a secured and confined area. 7. Prevent contact with water. 8. Do not use with incompatible substances.



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9. Do not return contaminated substance back to the container.
10. When mixed with water add the corrosive liquid to the water, not water add to the corrosive liquid. Continuous add cold water while stirring to prevent produce of excessive heat.
11. Pre-operation check if container has leakage.
12. Should have second protective container while moving the chemical.
13. Labeled the container. Secure and cover the container when not in use to prevent damage.
14. Use anti-corrosive transfer equipment, use light weight containers and small amount of the chemicals as much as possible per container.
15. Do not use air or inert gas to pressure the liquid out of the container.
16. Empty container maybe still have harmful substance.
17. Exhaust of the container should follow Chemical manufacturer/supplier's proposal. If the storage container is bloated, contact the manufacturer/supplier immediately for advice and seek proper procedure to deal with the container.
18. Operate in the vicinity should be conducive to a fire, spills and other emergency equipment to deal with °

Storage :

1. Stored in cool, dried and well ventilated area. Avoid direct contact with the sun light and other heat source
2. A small amount of storage as much as possible. Avoid storage of large volume of the chemical.
3. Check all new containers; check if properly labeled and if damaged.
4. Stored in the original labeled containers or manufacturer / supplier recommended storage containers
5. Marked to avoid damage and visible place, when not in use to keep containers closed.
6. Containers should be at the appropriate height in order for easier operation.
7. Maintain chemical manufacturer / supplier recommended storage temperature.
8. Empty container should be separated from the storage area.
9. Empty container may still have hazardous substance, keep it sealed.
10. Periodically check the storage area or whether the corrosion or leak.
11. Storage area should be properly labeled, with no obstruction and only allow the appointed or trained people to enter °
12. Separate operation area from storage area.
13. Post warning signs appropriately.
14. Use compatible material made plate to store leaked substance.
15. Must have attract leak agent.
16. Entrance system should be the threshold, drains slope or building, or into the containment to a safe place.
17. Impervious flooring to prevent self-absorption.
19. Exhaust of the container should follow Chemical manufacturer/supplier's proposal. If the storage container is bloated, contact the manufacturer/supplier immediately for advice and seek proper procedure to deal with the container.
20. Storage area walls, floors, scaffolding and accessories should be used sulfuric acid corrosion resistant material.
21. Storage equipment should be made of fire resistance materials.
22. Storage areas should have fire-fighting equipment and spill clean-up
23. Storage tanks should be on the ground, bottom part should be sealed to prevent leak.



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Section 8 - Exposure Controls & Personal Protection

Engineering measures : Indoor workplace should set up ventilation system.			
Control parameters			
TWA	STEL	Ceiling	Biological standards
--	--	5 ppm	--
<p>Personal protective equipment : Choose the right protective equipment in accordance with the working environment and the concentration of the hazardous substances. Obtain the anti-chemical-table from the supplier.</p> <ul style="list-style-type: none"> ■ Respiratory Protection : <ol style="list-style-type: none"> 1. 50ppm below : Use breathing apparatus with Hcl free chemical purifying cartridge, Powered air-purifying, self containing and portable styles. 2. Unknown concentration : Portable with positive pressure mode breathing apparatus, full piece self-contained with positive pressure mode breathing apparatus supported. 3. Escape : Mask with Anti-Acid gas cartridge, escape portable breathing apparatus. ■ Hand Protection : Impervious gloves made of Butyl rubber, rubber, Viton 、 CPF3 、 Saranex 、 Barricade 、 Responder the better. ■ Eye Protection : Gas-tight chemical safe protective goggles, full face shield. ■ Skin and Body Protection : Overall and boots made by the materials mentioned above. 			
<p>Hygiene measures :</p> <ol style="list-style-type: none"> 1. Develop good habits; eating is strictly prohibited in the workplace, after operation should wash hands. 2. Take off contaminated work cloths as soon as the work is done, wash before wearing or disposal, and should inform the laundry staff about the hazardous agent. 3. Prohibit smoking, eating and drinking in the work area. 4. After dealing with the substance, should wash hand completely. 5. Maintain cleanliness in the work area. 			

Section 9 - Physical & Chemical Properties

Appearance : transparent or light yellowish smoke liquid; humid easily	Odor : irritable choking smell
Olfactory threshold: 1-5ppm (detective)	Melting Point: -35°C
pH value : 1.1 (0.1N solution)	Boiling point/boiling range : 108.6 °C
Flammability: --	Flash point : no flash
Decomposition temp : --	Test method : --
Auto ignition temp : --	Explosion properties : --
Vapor pressure : 100 mmHg@20°C	Vapor density : 1.268(air=1)
Density : 1.18(H ₂ O=1)	Solubility : fully water soluble.
log Kow : --	Evaporation Rate : --

Section 10 - Stability & Reactivity Data



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Stability : stable in the normal condition.

Possible hazardous reactions under specific conditions :

1. Avoid high temperature (above 150 °C), to prevent generating of the hydrogen and Chlorine.
2. No polymerization by itself. But if contact with the incompatibles (like epoxide) may case polymerization.
3. Metal: may react and generate the flammable hydrogen.
4. Alkali (like Sodium hydroxide, Amines): cause violent reaction and generate the heat and pressure.
5. Aldehyde, epoxide: May cause violent polymerization and generate the heat and pressure.
6. Reductant: react and release the heat. Cause the fire accident and release the flammable hydrogen.
7. Oxidizers: may have reaction. Generate the heat and corrosive and poisonous chlorine gas.
8. Explosive: generate the heat and cause explosion.
9. Acetylene compound, bromide, Carbide, Silicides: may react and generate the flammable gases (like Acetylene).
10. Cyanide, sulfide: react and generate the poisonous gases (hydride cyanide or Hydrogen sulfide).
11. Phosphide: may react and release poisonous and flammable Phosphine.

Conditions to avoid : Avoid high temperature (above 150°C)

Materials to avoid : Metal, alkali (like Sodium hydroxide, Amines), aldehyde, epoxide, reductant, oxidizers, explosive, acetylene compound, bromide, Carbide, Silicides, Cyanide, sulfide, phosphide.

Hazardous decomposition products : --

Section 11 - Toxicological Information

Route of exposure : skin, inhalation, ingestion, eye

Symptoms : Irritation, Choking, coughing, burn, ulcer, pulmonary edema, dermatitis, blindness, change the color in teeth, and chronic bronchitis

Immediate Toxicity :

1. Skin : Cause severe irritation, inflammation, pain, corrosive injury and permanent scar and even death.
2. Inhalation :
 - 2.1 Extremely corrosive.
 - 2.2 Under 50~100ppm and PH₃ vapor or droplet cause severe irritation of the nose, sore throat, cough and dyspnea. Overtime exposure causes burn and ulcer in nose and throat.
 - 2.3 Under 1000~2000ppm for several minutes causes deathly pulmonary edema. The symptoms (like Shortness of breath) may appear several hours after.
3. Eye :
 - 3.1 Low concentration vapor or droplet cause redness of the eyes immediately.
 - 3.2 Splashed or contact with high concentrated vapor or droplet cause severe irritation, burn and even blindness.
4. Ingestion :
 - 4.1 Corrosive in injury, throat, esophagus and stomach. The symptoms include Dysphagia, nausea, vomit, diarrhea and even collapse and death.



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4.2 May cause severe injury and death if inhaled. <ul style="list-style-type: none">● LD₅₀: 900 mg/kg(rat, oral)● LC₅₀: 3124 ppm/1H(rat, inhale) ;5mg/30S(rabbit, eye) : cause mild irritation
Specific effects : <ol style="list-style-type: none">1. Low concentration of the chemical causes the teeth into brown. Skin inflammation, pain and Dermatitis. And may cause bleeding of the nose and the Gingiva or chronic Bronchitis and Gastritis.2. Expose in high concentration may cause erosion of teeth3. 450mg/m³/1H (pregnant 1day rodent, inhalation) Cause embryonic poisoning and abnormal development.4. IARC ranked as Group 3 : could not identified if it is human carcinogenic potential

Section 12 - Ecological Information

Ecotoxicology : <ul style="list-style-type: none">■ LC₅₀(fish) : 0.282mg/l/96H■ EC₅₀(Aquatic Invertebrates) : --■ Bioconcentration factor (BCF) : --
Persistence and degradability : -- <ul style="list-style-type: none">■ Half-Life (Air) : --■ Half-Life (Water surface) : --■ Half-Life (Groundwater) : --■ Half-Life (Soil) : --
Bioaccumulative potential : Does not accumulate in the body.
Mobility in soil : Would soaks into the soil and dissolves the materials in the soil. Especially the Carbonate base substance. In some cases, it will be neutralized.
Other adverse effects : --

Section 13 - Disposal Considerations

Methods of disposal : <ol style="list-style-type: none">1. Follow the processing of the storage condition for the waste products.2. Consider burry the neutralized waste products.3. Small spill: could add the contaminant into the water carefully. Use the Sodium carbonate or Calcium carbonate to neutralize slowly. Be careful with the generated heat and vapor in the procedure.
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Section 14 - MSDS Transport Information

UN classification number : 1789
Proper D.O.T Shipping Name : Hydrochloric acid
Hazard Class : Corrosive substance Category 8
Packing Group : II
Marine pollution : none
Specific precautionary transport measures and conditions : -



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Section 15 - Regulatory Information

Regulations :

1. Regulations for Labor Safety and Health Installations
2. Regulations for Chemical Hazard Communication
3. Toxic Chemical Substances Hazard Prevention and Response Plan Regulations
4. Permissible Exposure Limits of Hazardous Substances in the Work Environment
5. Road Traffic Safety Regulations
6. Industrial Waste Storage and Disposal Regulations and Facility Standards

Section 16 - Other Information

Literature references	CHEMINFO Database, CCINFO Disc, 2005-3 2.HAZARDTEXT Database, TOMES PLUS Disc, Vol.65, 2005 3.RTECS Database, TOMES PLUS Disc, Vol.65, 2005 4.HSDB Database, TOMES PLUS Disc, Vol.65, 2005 5. Chemical Hazards Chinese Database, Environmental Protection Department 6.ChemWatch Database, 2005-1		
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