

**MATERIAL SAFETY DATA SHEET**

REV. 5 Issued: May 4, 2012

**1. Chemical Product And Company Information**

**Chemical Name:** Hydrochloric Acid  
**Synonyms/Trade Names:** Aqueous hydrogen chloride, muriatic acid  
**Chemical Family:** Inorganic acid  
**Formula:** HCl  
**Molecular Weight:** 36.46  
**CAS No.:** 7647-01-0  
**Uses:** Acidification (activation) of petroleum wells; scale removal; ore reduction; metal cleaning; industrial acidification.

**Manufacturer & Supplier:**  
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(306) 931-7767

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(715) 887-4000

**Transportation Emergency Telephone Numbers :**  
CANADA: (613) 996-6666  
CANUTEC  
USA: 1-800-424-9300  
CHEMTREC

**Emergency Information:**

Call toll-free 24 hours a day:  
866-855-6947

**Canadian WHMIS Classification (s):**

D1A- Very Toxic



E - Corrosive



## 2. Composition / Information On Ingredients

Name:	Conc. % By Weight	CAS No.
Hydrogen chloride	35%	7647-01-0
Water	Balance	7732-18-5

## 3. Hazard Identification

### Emergency Overview:

Extremely corrosive. The severity of damage depends on the concentration of the acid and the duration of the exposure. In general, solutions and mists with a pH of 3 or less are a significant health concern. Contact with water will generate considerable heat. Contact with most metals will generate flammable hydrogen gas.

### Routes of Entry:

Inhalation, Skin Contact, Eye contact, Ingestion

### Symptoms of Exposure:

#### Inhalation:

HCl is a very strong acid. Solutions can be extremely corrosive. The severity of effects depends on the concentration of the solution and the duration of contact. In general, HCl solutions and mist with a pH of 3 or less are a significant health concern.

Vapour or mist from concentrated solutions can cause severe nasal irritation, sore throat, choking, coughing and difficulty breathing (50-100 ppm).(2) Prolonged exposures can cause burns and ulcers to the nose and throat.

Severe exposures (e.g., 1000-2000 ppm), for even a few minutes, can cause a life-threatening accumulation of fluid in the lungs (pulmonary edema).(2) Symptoms of pulmonary edema such as shortness of breath can be delayed for several hours after the exposure.

#### Skin Contact:

Hydrochloric acid liquid can cause severe irritation (redness, swelling, and pain) and corrosive skin damage with permanent scarring (or even death).

High vapour or mist concentration may cause redness, irritation and burns to skin if contact is prolonged. Skin covered by perspiration-dampened clothing can also be affected.

#### Eye Contact:

Low concentrations of vapour or mist (10-35 ppm) can be immediately irritating, causing redness.(2) Concentrated vapour, mist or splashed liquid can cause severe irritation, burns and permanent blindness.

#### Ingestion:

HCl solutions can cause corrosive burns to mouth, throat, esophagus and stomach. Symptoms may include difficulty in swallowing, intense thirst, nausea, vomiting, diarrhea and in severe cases, collapse and death.

Small amounts of acid which enter the lungs during ingestion or vomiting (aspiration) can cause serious lung injury and death.

**NFPA Ratings** (Scale 0-4): Health=3, Fire=0, Reactivity=1

**HMIS Ratings** (Scale 0-4): Health=3, Flammability=0, Reactivity =1

#### 4. First Aid Measures

**Skin:**

As quickly as possible, flush contaminated area with lukewarm, gently running water for at least 20 minutes. Under running water, remove contaminated clothing, shoes and leather goods. Obtain medical attention immediately.

**Eyes:**

Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for at least 20 minutes, holding the eyelid(s) open. Take care not to rinse contaminated water into the nonaffected eye. Obtain medical attention immediately.

**Inhalation:**

Remove source of contamination or move victim to fresh air. If victim is unconscious, do not give anything by mouth. Check breathing and pulse. If breathing has stopped, trained personnel should give artificial respiration. If heart has stopped, give cardiopulmonary resuscitation (CPR) immediately. If breathing becomes rapid and bubbly, place the person in a sitting position, and give oxygen if possible. Obtain medical attention immediately.

**Ingestion:**

Never give anything by mouth to an unconscious or convulsing person. Otherwise, rinse residual hydrochloric acid from the mouth with water. If the victim can swallow, give one cup of water or milk to dilute the material in the stomach. Do not induce vomiting. If vomiting occurs naturally, rinse mouth and give water again. Obtain medical attention immediately.

#### 5. Fire-Fighting Measures

**Conditions Of Flammability:**

Not flammable. Reacts with many metals (e.g. zinc, magnesium, aluminum, iron) releasing flammable hydrogen gas.

**Means To Extinguish:**

Does not burn. Use extinguishing agents compatible with acid and appropriate for the burning material. Use water spray to keep fire-exposed containers cool.

**Hazardous Combustion Products :**

Hydrogen and chlorine gas may form at temperatures greater than 1,500°C.

**Flash Point & Method:** Not combustible (does not burn)

**Upper Flammability Limit:** Not applicable

**Lower Flammability Limit:** Not applicable

**Auto-Ignition Temperature:** Not applicable

**Mechanical Impact Sensitivity:** Not available

**Static Discharge Sensitivity:** Not sensitive

## 6. Accidental Release Measures

### Leak Or Spill Procedures :

Only persons wearing protective equipment should be allowed in areas of leaks. Ventilate area. Vapors evolved from spill or leak can be knocked down with water fog or spray. Small spills and residues can be neutralized with alkalis such as soda ash or lime. This will release carbon dioxide, so use caution. Large spills should be contained, and if not recoverable, diluted with water or flushed to holding area and neutralized.

### Waste Control Procedures :

Consult appropriate Federal, State/Provincial and local regulatory authorities to ascertain disposal procedures. Waste hydrochloric acid or acid contaminated water, must never be discharged directly into sewers or surface water. Contaminated materials should be neutralized with soda ash ( $\text{Na}_2\text{CO}_3$ ), lime ( $\text{CaO}$ ), or limestone ( $\text{CaCO}_3$ ). The residual sludge can be shoveled into containers for disposal.

## 7. Handling Storage

### Handling Procedures And Equipment :

When diluting or preparing solutions, slowly add acid to water to avoid boiling and splattering. Always use in a well ventilated area, preferably with local ventilation.

### Storage:

Store closed containers in a clean, cool, open or well ventilated area. Keep out of sun. Keep away from incompatible materials.

## 8. Exposures Controls / Personal Protection

### Protective Equipment:

<50ppm - Supplied air respirator, self-contained breathing apparatus, chemical cartridge respirator, or a powered air purifying respirator both with cartridge(s) to protect against hydrogen chloride.  
>50ppm - full-facepiece supplied air respirator, or full-facepiece self-contained breathing apparatus. Impervious gloves, body suits, boots and/or other protective clothing. Recommended materials for protective clothing: butyl rubber, neoprene, nitrile rubber, Teflon™, Responder™, Viton™. Have a safety shower and eye-wash fountain readily available in the immediate work area.

### Engineering Controls:

Handling should be done in closed ventilation system (e.g. exhaust hood). In areas of heavy handling mechanical ventilation should be provided sufficient to reduce the vapour mist concentration below the permissible levels. Open processing equipment may require local exhaust systems. All must be corrosion resistant. Provide eye wash and quick drench facilities in areas of use.

## 9. Physical And Chemical Properties

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**State:** Liquid  
**Odour:** Pungent odor  
**Odour Threshold:** Detectable at 1-5 ppm HCl in air  
**Boiling Point:** 62°C  
**Melting Point:** not applicable  
**Freezing Point:** -35°C  
**pH:** not applicable to concentrated acids.  
**Coefficient Of Water/Oil Distribution:** Not available  
**Appearance:** Colorless or slightly yellow, fuming liquid.  
**Specific Gravity:** 1.18 @ 20°C  
**Vapour Pressure:** 84 mm Hg @ 20°C  
**Vapour Density:** 1.268 @ 20°C  
**Evaporation Rate:** Not available  
**Solubility In Water:** Completely miscible in water  
**Bulk Density:** Not applicable

## 10. Stability And Reactivity

### Chemical Stability:

Stable

### Reactivity Conditions:

Large amounts of heat can be released when mixed with strong sulfuric acid or with organic solvents.

### Incompatible Substances:

Most metals, alkalis, metallic oxides, amines and water-reacting substances such as sulfuric acid, oleum and acetic anhydride. Also carbonates, cyanides, and sulfides in contact with this acid liberate toxic gases. Reaction with hypochlorites will produce toxic chlorine gas.

METALS (e.g. steel, aluminum, magnesium or zinc) - extremely flammable hydrogen gas is released on reaction with many common metals.

SODIUM - explodes on contact.

BASES (e.g. sodium hydroxide, potassium hydroxide, ammonium hydroxide, amines, 2-aminoethanol or ethyleneimine) - react violently generating heat and pressure.

FORMALDEHYDE - can react to form the potent human carcinogen, bis(chloromethyl) ether.

OXIDIZING AGENTS (e.g. hydrogen peroxide, chlorates or chlorites) - may react generating heat and very toxic and corrosive chlorine gas.

REDUCING AGENTS (e.g. metal hydrides) - reaction may produce extremely flammable hydrogen gas, heat and fire.

PERCHLORIC ACID - decomposes spontaneously and violently.

SULFURIC ACID - dehydrates concentrated hydrochloric acid to release some 250 volumes of hydrogen chloride gas. In a closed tank, sufficient gas may be formed to cause the tank to burst violently.

POTASSIUM PERMANGANATE - a sharp explosion may be produced on adding concentrated hydrochloric acid to potassium permanganate.

ALDEHYDES or EPOXIDES - hydrochloric acid may catalyze violent polymerization, generating heat and pressure.

FLUORINE - incandescens on contact. Aqueous solutions produce flame.

ACETYLIDES (e.g. cesium acetylide or rubidium acetylide), BORIDES (e.g. magnesium boride),

CARBIDES (e.g. rubidium carbide), PHOSPHIDE (e.g. uranium phosphide) or SILICIDES (e.g. lithium silicide) - react producing spontaneously flammable gases (e.g. acetylene, borane, phosphine or silane, respectively).

HEXALITHIUM DISILICIDE - incandescens in concentrated acid; flammable silanes (silicon hydrides) are evolved on contact with dilute acid.

OTHER - Mixing 36% hydrochloric acid with acetic anhydride or chlorosulfonic acid or oleum or propiolactone or propylene oxide or vinyl acetate in a closed container caused the temperature and pressure to increase.

### Hazardous Decomposition Products:

Does not decompose but HCl gas evolution from the solution is accelerated by heating

## 11. Toxicological Information

**Skin Contact:** Can cause severe irritation (redness, swelling, and pain) and corrosive skin damage with permanent scarring (or even death). Prolonged exposure to vapour mists of high concentration will cause redness and burns to skin.

**Skin Absorption:** Usually penetrates the full thickness of the skin. Less exposure may cause dermatitis and photo sensitization.

**Eye Contact:** Low concentration of vapour or mist can be irritating, causing redness. Concentrated vapour, mist or splashed liquid can cause severe irritation, burns and permanent blindness.

**Inhalation:** Vapour or mist can cause irritation of the nose, throat and upper respiratory tract. Symptoms include coughing, choking, and bleeding of the nose and gums. Severe exposure can result in pulmonary edema and corrosion of tissues in the nose and throat.

**Ingestion:** Causes severe burns of the mouth, esophagus and stomach with consequent pain, nausea, vomiting, thirst, diarrhea, circulatory collapse and possible death.

**LD<sub>50</sub>:** 900 mg/kg (Rabbit/oral)  
238-277 mg/kg (oral, female rat)  
700 mg/kg (oral, rat)  
greater than 5010 mg/kg (dermal, rabbit)

**LC<sub>50</sub>:** 1405 ppm (male rat: 4-hour exposure; head-only); cited as 2810 ppm (1-hour exposure; head-only)  
1562 ppm (4-hour exposure; whole-body); cited as 3124 ppm (male rat: 1-hour exposure; whole-body)  
554 ppm (female mouse: 4-hour exposure; whole-body); cited as 1108 ppm (1-hour exposure; whole-body)  
475 ppm (male guinea pig: 4-hour exposure; head-only); cited as 1350 ppm (30-minute exposure; head-only)  
400 mg/m<sup>3</sup> (male mouse: 4-hour exposure; aerosol); cited as 3.2 mg/L (30-minute exposure; aerosol)  
5,666 ppm (Rat) Mist exposure 30 min.

**Exposure Limits:** ACGIH 2003 TWA-TLV (Ceiling) 2 ppm (2.8 mg/m<sup>3</sup>).  
OSHA PEL (Ceiling) 5 ppm (7 mg/m<sup>3</sup>)

**Irritancy:** Not available

**Sensitization:** Not available.

**Carcinogenicity:** IARC reports inadequate evidence of carcinogenicity in animals

**Teratogenicity & Mutagenicity:** Information not available.

**Reproductive Toxicology:** Information not available.

**Toxicological Synergism:** Not available.

## 12. Ecological Information

### Ecological Information:

Hydrochloric acid dissociates in water and will be neutralized by naturally occurring alkalinity. The acid will permeate soil, dissolving some soil material and will be somewhat neutralized.

### Biodegradability:

Not biodegradable (Biodegradability term pertains to an organic material capable of decomposition as a result of attack by microorganisms). However, hydrochloric acid will be neutralized to chloride by alkalinity present in natural environment.

### Aquatic Toxicity:

Hydrochloric acid can be acutely toxic to aquatic life via reduction of water pH. Most aquatic species do not tolerate pH lower than 5.5 for any extended period.

LC50 282 mg/L ( Mosquito Fish - 96 hr )

LC50 3.6 mg/L ( Bluegill - 48 hr )

LC50 100 - 330 mg/L (shrimp)

LC50 Species: *Carcinus maenas* (Green or European shore crab, adult); Conditions: saltwater, renewal, 15 deg C; Concentration: 240 mg/L for 48 hr

LC50 Species: *Crangon crangon* (Common shrimp, adult); Conditions: saltwater, renewal, 15 deg C; Concentration: 260 mg/L for 48 hr

EC50 Species: Osteichthyes (Bony fish, 6 taxa); Conditions: freshwater, flow through; Concentration: 0.000014 M for < or = 560 min Effect: chemical avoidance

LC50 Species: *Gambusia affinis* (Western mosquitofish, female adult); Conditions: freshwater, static, 21-23 deg C, pH 6.0-8.2, alkalinity <100 mg/L CaCO<sub>3</sub>; Concentration: 282 mg/L for 24, 48, 96 hr

LC50 Species: *Semotilus atromaculatus* (Creek chub); Conditions: river water, static, 15-21 deg C, hardness 98 mg/L CaCO<sub>3</sub>; Concentration: 60-80 mg/L for 24 hr

LC50 Species: *Lepomis macrochirus* (Blue gill); Conditions: artificial water, flow-through, 20 +/- 1 deg C, dissolved oxygen 5-9 mg/L; Concentration: 24.6 mg/L for 96 hr for small and medium size fish 30.9 mg/L for 96 hr for large size fish.

LC50 Species: *Lepomis macrochirus* (Blue gill); Conditions: dechlorinated tap water, static, 23 +/- 2 deg C, pH 3.0-7.5; Concentration: 55-31 mg/L for 96 hr

LC50 Species: *Oncorhynchus mykiss* (Rainbow trout); Conditions: dechlorinated tap water, recirculated, 15 +/- 2 deg C, pH 3.0-8.0, hardness 140 mg/L CaCO<sub>3</sub>; Concentration: 7.45 mg/L for 96 hr

LC50 Species: *Oncorhynchus mykiss* (Rainbow trout); Conditions: dechlorinated tap water, recirculated, 15 +/- 2 deg C, pH 3.0-8.0, hardness 14 mg/L CaCO<sub>3</sub>; Concentration: 10.3 mg/L for 96 hr

LC50 Species: *Cyprinus carpio* (Common carp) Conditions: dechlorinated tap water, semi-static, 23-24 deg C, pH 4.0-7.3, hardness 52 mg/L CaCO<sub>3</sub>, dissolved oxygen 7.2-8.4 mg/L; Concentration: 4.92 mg/L for 24, 48, 72, 96 hr

LC50 *Leusiscus idus* (Orfe) 862 mg/L for 48 hrs; Static bioassay

EC50 *Selenastum capricornutum* (Green algae) 0.0492 mg/L/72 hr (pH 5.3); Effect: growth rate /Conditions of bioassay not specified in source examined/

## 13. Disposal Considerations

### Disposal Considerations:

Disposal of all wastes must be done in accordance with municipal, provincial and federal regulations.



## 14. Transportation Information

Shipping Name (TDGR)	UN Number	Hazard Class	Packing Group
Hydrochloric Acid	1789	8	II

## 15. Regulatory Information

This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR .

### Safety:

**UNITED STATES FEDERAL REGULATIONS :** (not a comprehensive list)

**TOXIC SUBSTANCES CONTROL ACT (TSCA) INVENTORY:** All required components are listed on the inventory.

**OSHA:** Hazardous Substance under 29 CFR Section 1910, Subpart Z.

**CERCLA:** Hazardous Substance under 40 CFR Part 302, RQ = 5,000 lbs.

**SARA 313:** Toxic Chemical, subject to the reporting requirements of 40 CFR Part 372.2

**SARA 311/312 EPA HAZARD CATEGORIES:** Immediate (Acute) Health, Reactive Hazard

**SARA 302:** No ingredients subject to 40 CFR Part 355

**HEALTH:** Immediate Health

### CANADA

#### **WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) CLASSIFICATION**

WHMIS Classifications applicable to this product:

D1A - Poisonous and infectious material - Immediate and serious effects - very toxic

E (Corrosive Material) based on assignment to TDG Class 8

### Environmental:

#### **U S FEDERAL REGULATIONS**

#### **REPORTABLE QUANTITY (RQ)**

Reportable Quantity (RQ) is 5000 lbs.

#### **TOXIC SUBSTANCES CONTROL ACT**

Listed on TSCA Inventory

#### **SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) TITLE III**

Components identified with an asterisk (\*) in Section 2 are subject to the reporting requirements of Section 313 of Title III of the 1986 Superfund Amendments and Reauthorization Act (SARA) and 40 CFR Part 372.

### CANADA

#### **CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA)**

All components of this product are on the Domestic Substances List (DSL).

#### **HAZARDOUS PRODUCTS ACT**

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR).

### EUROPE

EINECS No.: 231-595-7

### Transportation:

Refer to Section 14.

ERG Number 157

## 16. Other Information

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**Summary of Changes Made in this Revision :**

Toxicological Information (section 11) and Ecological Information (section 12) were reviewed and updated.

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