



**HYDROCHLORIC ACID (HCl)**  
**PRODUCT MATERIAL SAFETY DATA SHEET (MSDS)**

**REVISION HISTORY**

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## **1 DISCLAIMER**

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## 2 HYDROCHLORIC ACID (HCl)

### 2.1 PRODUCT IDENTIFICATION

**Chemical Name** Hydrochloric Acid

**Synonyms** Muriatic Acid, Spirit of Salts, Aqueous,  
Hydrogen chloride

### 2.2 HAZARDS IDENTIFICATION

#### OVERVIEW

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE, MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG DAMAGE.

Health Rating: 3 - Severe (Poison)

Flammability Rating: 0 – None

Reactivity Rating: 2 – Moderate

Contact Rating: Extreme (Corrosive)

#### TOXICITY ROUTES OF EXPOSURE

**Ingestion:** Corrosive! Swallowing hydrochloric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract. May cause nausea, vomiting, and diarrhea. Swallowing may be fatal.

**Inhalation:** Corrosive! Irritating to respiratory tract; inhalation of vapors can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract, and in severe cases, pulmonary edema, circulatory failure, and death.

**Skin Contact:** Corrosive! Can cause redness, pain, and severe skin burns unless the hydrochloric acid is washed off immediately. Skin may dry or crack due to astringent nature of material. Repeated skin contact may lead to development of dermatitis. Concentrated solutions cause deep ulcers and discolor skin.

**Eye Contact:** Corrosive! Eye contact results in severe irritation and painful burns of the eyes and eyelids. If material is not removed by copious irrigation with water at room temperature, visual impairment or total loss of vision could result.

### **CHRONIC EXPOSURE**

Prolonged exposure to low-level concentrations of hydrochloric acid vapor may cause discoloration and erosion of teeth, bleeding of nose and gums, and ulcers of the nasal mucosa. Asthma, bronchitis, emphysema, bronchial hyperactivity, skin allergies, and eczema may all be aggravated by exposure to hydrochloric acid vapor

### **MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:**

Persons with pre-existing skin disorders or eye disease may be more susceptible to the effects of this substance.

The discomfort caused by hydrochloric acid vapor is usually sufficient to induce a person to leave areas of excessive concentrations; vapor can be fatal to those sprayed with acid or trapped in enclosed areas.

## **2.3 COMPOSITION / INGREDIENTS**

<b>Hydrochloric Acid, %</b>	31-33%
<b>Chemical Formula</b>	HCl
<b>Molecular Weight</b>	36.46 g/mole
<b>CAS Registry No:</b>	7647-01-0

## **2.4 FIRST AID MEASURES**

- Skin** In case of contact, immediately flush skin with plenty of water, avoiding hot water or hard scrubbing, for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse.
- Eyes** Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally to ensure thorough rinsing; delay can result to permanent injury.
- Inhalation** Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
- Ingestion** DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

### **SEEK MEDICAL ATTENTION IMMEDIATELY**

## **2.5 FIRE FIGHTING MEASURES**

Fire Hazards	Extreme heat or contact with metals can release flammable hydrogen gas.
Explosion Hazards	Not considered as an explosion hazard
Fire Prevention / Extinguishing Media	If involved in fire, use water spray. Neutralize with soda ash or slaked lime.
Special Information:	In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand or positive pressure mode. Structural firefighter's protective clothing is ineffective for fires involving hydrochloric acid. Stay away from ends of tanks. Cool tanks with water spray until well after fire is out

## **2.6 ACCIDENTAL RELEASE MEASURES**

Review safety precautions before proceeding with cleanup. Use appropriate personal protection equipment. Evacuate area and stay upwind. Attempts to stop or reduce leak should be made only by trained personnel, when there is at most a minimal risk of injury. Large spills should be contained with dikes and pumped into tanks suitable for acid storage. Full acid-resistant suits and self-contained breathing apparatus should be worn. Use a water fog or spray to control vapors. Neutralize spill with lime (calcium hydroxide), limestone (calcium carbonate), or soda ash (sodium carbonate). CAUTION: limestone and soda ash will evolve CO<sub>2</sub>; ventilation should be provided in closed areas. Dike area around spill to prevent spreading, and use of absorbent material to pick up spill.

## **2.7 HANDLING AND STORAGE**

Storage tanks and piping for HCl should be constructed of materials recommended for corrosive products. FRP, PVC, HDPE, and/or rubber are the materials of choice for piping and storage tank. Metering pumps and other equipment that comes in contact with concentrated solutions of HCl must also be constructed of acid resistant materials such as PVC, rubber, Teflon, ceramic and Hastalloy C. No wetted parts shall contain metals such as carbon steel, stainless steel, brass or aluminum.

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. When diluting, the acid should always be added to water slowly and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. When opening metal containers, use non-sparking tools because of the possibility of hydrogen gas being present. Observe all warnings and precautions listed for the product.

## 2.8 EXPOSURE CONTROLS AND PROTECTION

- Airborne Exposure Limits:** For Hydrochloric acid:  
OSHA Permissible Exposure Limit (PEL): 5 ppm (ceiling)  
ACGIH Threshold Limit Value (TLV): 2 ppm (Ceiling),  
A4 not classifiable as a human carcinogen
- Ventilation:** A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area.
- Protective Equipment for the Eyes and Skin:** Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure to prevent skin contact. Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.
- Respiratory Protection Requirements:** (NIOSH Approved): If the exposure limit is exceeded, a full face piece respirator with an acid gas cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full face piece positive-pressure, air-supplied respirator.  
**WARNING:** Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

## 2.9 PHYSICAL AND CHEMICAL PROPERTIES

- State** Fuming liquid
- Appearance** Colorless
- Odor** Pungent odor of hydrogen chloride
- pH** Strong Acid (<1)
- Boiling Point** 53C (127F) Azeotrope (20.2%) boils at 109C (228F)
- Melting Point:** -74C
- Specific Gravity** 1.15-1.164



**Vapor Pressure** 190 @ 25C (77F)

**Solubility In Water:** Infinite with slight evolution of heat

## **2.10 STABILITY AND REACTIVITY**

**Stability** Stable under ordinary conditions of use and storage.  
Containers may burst when heated.  
Hazardous polymerization will not occur

**Hazardous decomposition product** When heated to decomposition, emits toxic hydrogen chloride fumes and will react with water or steam to produce heat and toxic and corrosive fumes. Thermal oxidative decomposition produces toxic chlorine fumes and explosive hydrogen gas.

**Incompatibilities:** A strong mineral acid, concentrated hydrochloric acid is incompatible with many substances and highly reactive with strong bases, metals, metal oxides, hydroxides, amines, carbonates and other alkaline materials.  
Incompatible with materials such as cyanides, sulfides, sulfites, and formaldehyde.

**Conditions to avoid:** Heat, direct sunlight.

## **2.11 TOXICOLOGICAL INFORMATION**

**Inhalation rat LC50:** 3124 ppm/1H; oral rabbit LD50: 900 mg/kg (Hydrochloric acid concentrated); investigated as a tumorigen, mutagen, reproductive effector.

**Carcinogenicity:** None of the components of this material are listed as a carcinogen by IARC, NTP, OSHA or ACGIH.

## **2.12 ECOLOGICAL INFORMATION**

**Environmental Fate** When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater.

**Environmental Toxicity** This material is expected to be toxic to aquatic life.

## **2.13 DISPOSAL CONSIDERATIONS**

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to an approved waste facility. Processing, use or contamination of this product may change the waste management options. Dispose of waste in accordance with applicable federal, state and local requirements.

## **2.14 TRANSPORT INFORMATION**

### Transportation of Dangerous Goods

TDG Classification	Do not ship by air
DOT Hazard Classification	Class 8; Corrosive: Group II
DOT Shipping Name	Hydrochloric acid ID: UN 1789

## **2.15 REGULATORY INFORMATION**

**TSCA:** CAS No. 7647-01-0 is listed on the TSCA Chemical Substance Inventory

## **2.16 OTHER INFORMATION**

**NFPA Rating:** Health: 3 Flammability: 0 Reactivity: 1

### **Label Hazard Warning:**

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG DAMAGE.

### **Label Precautions:**

Do not get in eyes, on skin, or on clothing.  
Do not breathe vapor or mist.  
Use only with adequate ventilation.  
Wash thoroughly after handling.  
Store in a tightly closed container.  
Remove and wash contaminated clothing promptly