

MASS.
MA13.2:
R245/21
hydro. chlor.



Commonwealth of Massachusetts

RECOMMENDED SAFE PRACTICES BULLETIN HYDROCHLORIC ACID

Synonyms: Muriatic Acid, Chlorohydric Acid, Hydrochloride, Hydrogen Chloride, Spirits of Salt

C.A.S. Number: 7647-01-0

Chemical Formula: HCl

Date Completed: 9/88

HAZARD SUMMARY

- Hydrochloric acid vapors can irritate the lungs and cause bronchitis. Higher exposure can cause a build-up of fluid in the lungs and lead to death.
- Repeated contact with dilute solutions may cause skin rash or irritation.
- Hydrochloric acid is corrosive, and contact can cause eye damage and possibly blindness. It may also cause severe skin burns.
- Exposure can irritate the mouth, nose and throat. Long-term exposure can cause erosion of the teeth.

GENERAL DESCRIPTION

Hydrochloric acid is used in the production of fertilizers, dyes, dyestuffs, and paint pigments; in electroplating, metal pickling, leather tanning and soap refining. It is also used in laboratories and the photographic, textile and rubber industries.

HEALTH HAZARD INFORMATION

Exposure to hydrochloric acid may occur by inhalation, ingestion, skin contact and eye contact.

ACUTE (short-term) HEALTH EFFECTS

Inhalation: Breathing the vapor can irritate the mouth, nose and throat. High levels may irritate

Table of Contents

- p1. Acute Health Effects
- p2. Chronic Health Effects
- p3. Emergency Information
- p4. Protective Measures
- p5. Storage and Reactivity Information
- p5. Physical and Chemical Data
- p6. Definitions

Department of Labor and Industries - Division of Occupational Hygiene
1001 Watertown Street, West Newton, MA 02165

the lungs, causing coughing and/or shortness of breath. Higher levels can cause a build-up of fluid in the lungs which can lead to death.

Ingestion: Hydrochloric acid may cause burns or ulceration of the mouth, throat, esophagus and stomach. Symptoms include pain, nausea, vomiting, salivation and thirst. Ingestion of even larger amounts may cause shock (symptoms: chills, cold, pale, bluish skin; sweating; rapid pulse and low blood pressure).

Skin Contact: Hydrochloric acid may cause extremely painful skin burns.

Eye Contact: Eye contact may cause pain, tearing, redness or blurred vision. Permanent eye injury may result if the acid is not immediately washed out with large amounts of water.

CHRONIC (long-term) HEALTH EFFECTS

Inhalation: Breathing hydrochloric acid may cause tooth erosion. Chronic inhalation may also cause chronic cough.

Skin Exposure: Exposure to vapors or dilute solutions may cause dermatitis.

Cancer Hazard: Not listed as a carcinogen by the International Agency for the Research of Cancer (IARC), the National Toxicology Program (NTP) or the Environmental Protection Agency's Carcinogen Assessment Group.

Reproductive Hazard: In a limited number of studies hydrochloric acid has been shown to cause mutations in living cells. There is inadequate information to determine any other reproductive effects of this chemical.

CONDITIONS THAT MAY BE AGGRAVATED BY EXPOSURE

Not Available.

MEDICAL MONITORING

Medical monitoring for workers exposed to one half (or more) of the recommended exposure limit is advisable. The medical monitoring should include an annual medical and occupational history, physical examination and lung function tests. A chest x-ray may be advisable after an acute overexposure to hydrochloric acid.

OCCUPATIONAL EXPOSURE LIMITS

Most OSHA exposure limits are based on recommendations made by ACGIH. Other recommendations by NIOSH may be more protective of human health. Many chemicals have not been studied for long-term effects. Because of individual susceptibility, a small percentage of workers exposed to this substance at or below any of the recommended limits may experience some ill effects.

OSHA: The legal airborne exposure limit, not to be exceeded at any time, is 5 ppm.

ACGIH: The recommended airborne exposure limit, not to be exceeded at any time, is 5 ppm.

EMERGENCY INFORMATION

FIRST AID

Inhalation: Remove victim to fresh air immediately. Perform artificial respiration if breathing has stopped. Get medical attention immediately. Medical observation is recommended for 24-48 hours after exposure, since pneumonia may be delayed.

Ingestion: Do not induce vomiting. Drink large amounts of water or milk. If vomiting occurs, continue drinking of water or milk. Get medical attention immediately.

Skin: Immediately remove contaminated clothing. Flush the affected area with water for at least 15 to 20 minutes. Cover area of chemical burns with sterile, dry dressing and get medical attention immediately.

Eyes: Flush eyes with large amounts of water for at least 15 to 20 minutes, occasionally lifting upper and lower lids.

FIRE AND EXPLOSION

NFPA Rating
Flammability: 0
Reactivity: 0
Health: 3

Flash Point: Not flammable under normal temperature and pressure
Extinguishing Media: Dry chemical, carbon dioxide, water spray and foam
Flammable Limits: N.A.

Respiratory Protection:

Firefighting - Fullface self-contained breathing apparatus in positive-pressure mode.

Escape - Any acid gas mask
- Any escape self-contained breathing apparatus

Protective Equipment: Supplied-air, acid-resistant suits may be necessary under some circumstances.

SPILL, LEAK AND DISPOSAL PROCEDURES

Small Spills: Remove unnecessary personnel from the area. Personnel performing cleanup should use appropriate protective equipment (see PROTECTIVE MEASURES). Absorb spill with sand or other absorbent material. Neutralize the spill with sodium bicarbonate, lime or crushed limestone.

Large Spills: Contain the spill. Isolate the hazard area. Follow procedures for a small spill.

Disposal: Contact the Massachusetts Department of Environmental Quality Engineering for proper disposal procedures.

EMERGENCY INFORMATION

CHEMTREC: (800) 424-9300

Poison Information Center: (800) 682-9211; 232-2120 (Boston area only)

PROTECTIVE MEASURES

ENGINEERING CONTROLS

Engineering controls are better than personal protective equipment. Engineering controls may include local exhaust ventilation, enclosure of the process, general dilution ventilation and others. However, for some jobs (such as outside work, confined space entry, non-routine maintenance, emergencies, and jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

RESPIRATORY PROTECTION

Improper use of respirators can be dangerous. Only respirators that have been approved by NIOSH or MSHA for exposures to hydrochloric acid should be used. Such equipment should only be used if the employer has a written program that takes into account air concentrations of the contaminant, and includes respirator fit testing, regular training, maintenance, inspection, cleaning, and evaluation.

The following guide should be consulted when selecting respirators:

<u>Hydrochloric Acid Air Concentration</u>	<u>Minimum Respiratory Protection</u>
50 ppm or less	<ul style="list-style-type: none">- Any chemical cartridge respirator with acid gas cartridges, or- Any supplied-air respirator, or- Any self-contained breathing apparatus (SCBA)
100 ppm or less	<ul style="list-style-type: none">- Full facepiece chemical cartridge respirator with acid gas cartridges, or- A gas mask with acid gas canister, or- Any full facepiece, helmet or hood supplied-air respirator- Any full facepiece SCBA
Greater than 100 ppm or entry into unknown concentrations	<ul style="list-style-type: none">- Full facepiece SCBA operated in a positive-pressure mode, or- A combination of Type C full facepiece supplied-air respirator operating in positive-pressure mode and an auxiliary SCBA (as described above)

PROTECTIVE EQUIPMENT

Eye Protection: Splash-proof goggles and/or face shields should be worn when there is a possibility of eye or face contact with hydrochloric acid. An eye-wash fountain should be provided in the immediate work area.

Clothing: Protective clothing (e.g., aprons) should be used when there is a possibility of skin contact with hydrochloric acid. Natural rubber and some synthetic rubbers are resistant to hydrochloric acid. An emergency shower should also be provided in the immediate work area.

STORAGE AND REACTIVITY INFORMATION

REACTIVITY

Stable under normal temperature and pressure.

INCOMPATIBILITIES

Metals, strong bases, alcoholic hydrogen cyanide, tetraselenium tetranitride, potassium permanganate, sulfuric acid, perchloric acid, acetic anhydride, 2-aminoethanol, chlorosulfonic acid, ethylenediamine, ethylene imine, oleum, beta-propiolactone, propylene oxide, vinyl acetate, mercury sulfate, formaldehyde (forms toxic dichlorodimethyl ether), 1,1 difluoroethylene, Dowicil 100 (decomposition), sulphides.

HAZARDOUS DECOMPOSITION PRODUCTS

Thermal decomposition may release corrosive hydrogen chloride gas.

STORAGE

Store away from alkali or active metals (e.g., potassium, sodium, zinc) in a cool, well-ventilated area.

PHYSICAL AND CHEMICAL DATA

Boiling Point: 384°F (196°C)

Melting Point: N.A.

Vapor Pressure: N.A.

Specific Gravity (water=1): 1.2

Molecular Weight: 36.46

Solubility in Water: Soluble

Evaporation Rate: N.A.

Vapor Density: 1.3

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits for exposure to workplace chemicals.

Action level is the amount of a chemical in the air above which OSHA-specified medical and air monitoring must be done.

A carcinogen is a substance that causes cancer.

The C.A.S. number is assigned by the Chemical Abstracts Service to identify a specific chemical.

The flash point is the temperature at which a liquid or solid gives off enough vapor to form a flammable mixture with air.

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of how much of a chemical is in the air.

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A mutagen is a substance that causes a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

ppm means parts of a substance per million parts of air. It is a measure of how much gas or vapor is in the air.

A teratogen is a substance that causes birth defects by damaging the fetus.

The vapor pressure is a measure of how easily a liquid or a solid gives off vapors. A higher vapor pressure indicates a higher concentration of the substance in the air, and therefore increases the amount of it breathed in.

WHERE TO GO FOR ADDITIONAL INFORMATION

The following information is available from the Massachusetts Department of Labor and Industries.

RIGHT TO KNOW INFORMATION

The Right to Know Program can answer questions about particular chemicals, training, labeling, and other Right to Know matters. Violations of the Right to Know Law should be reported to the nearest office of the Department of Labor and Industries.

PUBLIC PRESENTATIONS

Presentations and educational programs on occupational health or the Right to Know Law can be given for labor unions, trade associations and other groups.

OCCUPATIONAL HEALTH AND SAFETY SERVICES

Upon receipt of a complaint, an inspection may be conducted at your workplace. An inspection may include a walk-through, air monitoring, and evaluation of existing conditions and controls. Complaints about workplace health and safety conditions may be reported to any office of the Department of Labor and Industries. Such complaints are maintained strictly confidential. In addition, employers may obtain free technical assistance in complying with OSHA standards and the Massachusetts Right to Know Law.

MEDICAL EVALUATION

The Division of Occupational Hygiene has the names of various occupational health services and occupational physicians who are board-certified. This information is available upon request.

MASSACHUSETTS DEPARTMENT OF LABOR AND INDUSTRIES

Division of Occupational Hygiene

West Newton (617) 969-7177

Division of Industrial Safety

Boston (617) 727-3460
Lawrence (617) 681-7798

New Bedford (617) 997-8263
Springfield (413) 734-1421

Worcester (617) 752-6504
Pittsfield (413) 445-4214