

CID 313

Hydrochloric acid

Safety and Hazards





1.1 Hazards Identification



1.1.1 GHS Classification



Showing 1 of 7 View More

Pictogram(s)	  Corrosive Acute Toxic
Signal	<u>Danger</u>
GHS Hazard Statements	H314: Causes severe skin burns and eye damage [<u>Danger</u> Skin corrosion/irritation] H331: Toxic if inhaled [<u>Danger</u> Acute toxicity, inhalation]
Precautionary Statement Codes	P260, P261, P264, P271, P280, P301+P330+P331, P303+P361+P353, P304+P340, P305+P351+P338, P310, P311, P321, P363, P403+P233, P405, and P501 (The corresponding statement to each P-code can be found at the GHS Classification page.)

▶ [EU REGULATION \(EC\) No 1272/2008](#)

1.1.2 Hazard Classes and Categories



Showing 2 of 6 View More

Press. Gas

Acute Tox. 3 *

Skin Corr. 1A

▶ [EU REGULATION \(EC\) No 1272/2008](#)

Press. Gas (Liq.) (16.59%)

Met. Corr. 1 (21.07%)

Skin Corr. 1A (99.89%)

Eye Dam. 1 (17.65%)


Acute Tox. 3 (46.45%)

STOT SE 3 (62.83%)

▶ [European Chemicals Agency \(ECHA\)](#)

1.1.3 NFPA Hazard Classification




NFPA 704 Diamond	 3-0-1
NFPA Health Rating	3 - Materials that, under emergency conditions, can cause serious or permanent injury.
NFPA Fire Rating	0 - Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand.
NFPA Instability Rating	1 - Materials that in themselves are normally stable but that can become unstable at elevated temperatures and pressures.

▶ [Occupational Safety and Health Administration \(OSHA\)](#)

1.1.4 EPA Safer Chemical



Chemical: Hydrochloric acid (aqueous)

 Yellow triangle - The chemical has met Safer Choice Criteria for its functional ingredient-class, but has some hazard profile issues. Specifically, a chemical with this code is not associated with a low level of hazard concern for all human health and environmental endpoints. (See [Safer Choice Criteria](#)). While it is a best-in-class chemical and among the safest available for a particular function, the function fulfilled by the chemical should be considered an area for safer chemistry innovation.

▶ [EPA Safer Choice](#)

1.1.5 Substance of Very High Concern (SVHC)



OSHA Highly Hazardous Chemicals, Toxics and Reactives

Chemical: Hydrochloric Acid, Anhydrous Threshold: 5000 [lb] Note: Hydrochloric Acid, Anhydrous in quantities at or above 5000lb presents a potential for a catastrophic event as a toxic or reactive highly hazardous chemical.

▶ [Occupational Safety and Health Administration \(OSHA\)](#)

1.1.6 Health Hazards



Inhalation of fumes results in coughing and choking sensation, and irritation of nose and lungs. Liquid causes burns. (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

▶ [CAMEO Chemicals](#)

Gas concentrations of 50 to 100 ppm are tolerable for 1 hour. Concentrations of 1,000 to 2,000 ppm are dangerous, even for brief exposures. More severe exposures will result in serious respiratory distress and prolonged exposures will result in death. Mists of hydrochloric acid are considered less harmful than anhydrous hydrochloric acid, because

droplets have no dehydrating action. Individuals with respiratory problems and digestive diseases may be adversely affected by low level exposures to the gas or mist. (EPA, 1998)

U.S. Environmental Protection Agency. 1998. Extremely Hazardous Substances (EHS) Chemical Profiles and Emergency First Aid Guides. Washington, D.C.: U.S. Government Printing Office.

▶ CAMEO Chemicals

Excerpt from ERG Guide 125 [Gases - Corrosive]: TOXIC; may be fatal if inhaled, ingested or absorbed through skin. Vapors are extremely irritating and corrosive. Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite. Fire will produce irritating, corrosive and/or toxic gases. Runoff from fire control may cause pollution. (ERG, 2016)

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2016 Emergency Response Guidebook. <https://www.phmsa.dot.gov/hazmat/outreach-training/erg> (accessed April 26, 2016).

▶ CAMEO Chemicals

1.1.7 Fire Hazards



Special Hazards of Combustion Products: Toxic and irritating vapors are generated when heated. (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

▶ CAMEO Chemicals

Fire may produce irritating or poisonous gases. Containers may explode in heat of fire. At high temperatures, it decomposes into **hydrogen** and **chlorine**. The following materials should be avoided: **Mercuric sulfate** -- violent reaction with gaseous hydrochloric acid at 250F. **Sodium** -- reacts vigorously with gaseous hydrochloric acid. **Acetic anhydride**, **2-aminoethanol**, **ammonium hydroxide**, **chlorosulfonic acid**, **ethylene diamine**, **ethyleneimine**, **oleum**, **propiolactone**, **sodium hydroxide**, **sulfuric acid**, and **vinyl acetate** -- increase in temperature and pressure when mixed with hydrochloric acid. Calcium phosphide -- energetic reaction with hydrochloric acid. **Silver perchlorate** and **carbon tetrachloride** -- when mixed in combination with hydrochloric acid forms a compound that detonates at 105F. **Formaldehyde** -- when mixed with hydrochloric acid forms a human carcinogen. Material reacts violently with bases and is corrosive with the generation of heat. Reacts with base metals, forming combustible gas (hydrogen). Reacts violently with strong oxidants forming toxic gas (**chlorine**). Avoid heat; at high temperatures it will decompose into **hydrogen** and **chlorine**. (EPA, 1998)

U.S. Environmental Protection Agency. 1998. Extremely Hazardous Substances (EHS) Chemical Profiles and Emergency First Aid Guides. Washington, D.C.: U.S. Government Printing Office.

▶ CAMEO Chemicals

Excerpt from ERG Guide 125 [Gases - Corrosive]: Some may burn but none ignite readily. Vapors from liquefied gas are initially heavier than air and spread along ground. Some of these materials may react violently with **water**. Cylinders exposed to fire may vent and release toxic and/or corrosive gas through pressure relief devices. Containers may explode when heated. Ruptured cylinders may rocket. For **UN1005**: Anhydrous **ammonia**, at high concentrations in confined spaces, presents a flammability risk if a source of ignition is introduced. (ERG, 2016)

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2016 Emergency Response Guidebook. <https://www.phmsa.dot.gov/hazmat/outreach-training/erg> (accessed April 26, 2016).

▶ CAMEO Chemicals

Not combustible.

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

Corrosives, Reactive - 1st degree

▶ [NJDOH RTK Hazardous Substance List](#)

1.1.8 Hazards Summary



At room temperature, hydrogen chloride is a colorless to slightly yellow, corrosive, nonflammable gas that is heavier than air and has a strong irritating odor. On exposure to air, hydrogen chloride forms dense white corrosive vapors. Hydrogen chloride can be released from volcanoes. Hydrogen chloride has many uses, including cleaning, pickling, electroplating metals, tanning leather, and refining and producing a wide variety of products. Hydrogen chloride can be formed during the burning of many plastics. Upon contact with [water](#), it forms hydrochloric acid. Both hydrogen chloride and hydrochloric acid are corrosive.

▶ [CDC-ATSDR Toxic Substances Portal](#)

Hydrochloric acid has many uses. It is used in the production of chlorides, fertilizers, and dyes, in electroplating, and in the photographic, textile, and rubber industries. Hydrochloric acid is corrosive to the eyes, skin, and mucous membranes. Acute (short-term) inhalation exposure may cause eye, nose, and respiratory tract irritation and inflammation and pulmonary edema in humans. Acute oral exposure may cause corrosion of the mucous membranes, esophagus, and stomach and dermal contact may produce severe burns, ulceration, and scarring in humans. Chronic (long-term) occupational exposure to hydrochloric acid has been reported to cause gastritis, chronic bronchitis, dermatitis, and photosensitization in workers. Prolonged exposure to low concentrations may also cause dental discoloration and erosion. EPA has not classified hydrochloric acid for carcinogenicity.

▶ [EPA Air Toxics](#)

1.1.9 Skin, Eye, and Respiratory Irritations



An aqueous solution (4%) of hydrogen chloride was slightly irritating, and a 10% solution was determined to be 'Irritating to skin' ... in human volunteer experiments.

Organisation for Economic Cooperation and Development; Screening Information Data Set for Hydrogen Chloride, CAS # 7647-01-0, p. 17 (2002). Available from, as of July 7, 2007: <https://www.chem.unep.ch/irptc/sids/OECD/SIDS/sidspub.html>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.1.10 EPA Hazardous Waste Number



D002; A waste containing hydrochloric acid may or may not exhibit the characteristics of corrosivity following testing prescribed by the Resource Conservation and Recovery Act (RCRA) regulations.

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.2 Safety and Hazard Properties



1.2.1 Acute Exposure Guideline Levels (AEGs)



1.2.1 AEGLs Table



AEGLs	10 min	30 min	60 min	4 hr	8 hr
AEGL 1: Notable discomfort, irritation, or certain asymptomatic non-sensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure (Unit: ppm)	1.8	1.8	1.8	1.8	1.8
AEGL 2: Irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape (Unit: ppm)	100	43	22	11	11
AEGL 3: Life-threatening health effects or death (Unit: ppm)	620	210	100	26	26

▶ [EPA Acute Exposure Guideline Levels \(AEGLs\)](#)

1.2.2 AEGLs Notes



AEGLs Status: Final

▶ [EPA Acute Exposure Guideline Levels \(AEGLs\)](#)

1.2.2 Flammable Limits



Flammability

Nonflammable Gas

▶ [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

1.2.3 Lower Explosive Limit (LEL)



Not combustible. (EPA, 1998)

U.S. Environmental Protection Agency. 1998. Extremely Hazardous Substances (EHS) Chemical Profiles and Emergency First Aid Guides. Washington, D.C.: U.S. Government Printing Office.

▶ [CAMEO Chemicals](#)

1.2.4 Upper Explosive Limit (UEL)



Not combustible. (EPA, 1998)

U.S. Environmental Protection Agency. 1998. Extremely Hazardous Substances (EHS) Chemical Profiles and Emergency First Aid Guides. Washington, D.C.: U.S. Government Printing Office.

▶ [CAMEO Chemicals](#)

1.2.5 Critical Temperature & Pressure



Critical temperature: 51.4 °C; critical pressure: 81.6 atm

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 888

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.2.6 Physical Dangers



The gas is heavier than air and may accumulate in lowered spaces causing a deficiency of **oxygen**.

- ▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

1.2.7 Explosive Limits and Potential



Behavior in fire: Pressurized container may explode and release toxic, irritating vapors.

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.2.8 OSHA Standards



Permissible Exposure Limit: Table Z-1 Ceiling value: 5 ppm (7 mg/cu m).

29 CFR 1910.1000 (USDOL); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 4, 2015: <https://www.ecfr.gov>

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.2.9 NIOSH Recommendations



Recommended Exposure Limit: Ceiling value: 5 ppm (7 mg/cu m).

NIOSH. NIOSH Pocket Guide to Chemical Hazards. Department of Health & Human Services, Centers for Disease Control & Prevention. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2010-168 (2010). Available from: <https://www.cdc.gov/niosh/npg>

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.3 First Aid Measures



1.3.1 First Aid



INHALATION: remove person to fresh air; keep him warm and quiet and get medical attention immediately; start artificial respiration if breathing stops. **INGESTION:** have person drink **water** or milk; do NOT induce vomiting. **EYES:** immediately flush with plenty of **water** for at least 15 min. and get medical attention; continue flushing for another 15 min. if physician does not arrive promptly. **SKIN:** immediately flush skin while removing contaminated clothing; get medical attention promptly; use soap and wash area for at least 15 min. (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

- ▶ [CAMEO Chemicals](#)

Warning: Hydrogen chloride is extremely corrosive. Caution is advised. Signs and Symptoms of Acute Hydrogen Chloride Exposure: Signs and symptoms of acute ingestion of hydrogen chloride may be severe and include salivation, intense thirst, difficulty in swallowing, chills, pain, and shock. Oral, esophageal, and stomach burns are common. Vomitus generally has a coffee-ground appearance. The potential for circulatory collapse is high following ingestion of

hydrogen chloride. Acute inhalation exposure of hydrogen chloride may result in sneezing, hoarseness, choking, laryngitis, and respiratory tract irritation. Bleeding of nose and gums, ulceration of the nasal and oral mucosa, bronchitis, pneumonia, dyspnea (shortness of breath), chest pain, and pulmonary edema may also occur. If the eyes have come in contact with hydrogen chloride, irritation, pain, swelling, corneal erosion, and blindness may result. Dermal exposure may result in dermatitis (red, inflamed skin), severe burns, and pain. Emergency Life-Support Procedures: Acute exposure to hydrogen chloride may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination. Inhalation Exposure: 1. Move victims to fresh air. Emergency personnel should avoid self-exposure to hydrogen chloride. 2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer **oxygen** or other respiratory support. 3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures. 4. RUSH to a health care facility. Dermal/Eye Exposure: 1. Remove victims from exposure. Emergency personnel should avoid self-exposure to hydrogen chloride. 2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer **oxygen** or other respiratory support. 3. Remove contaminated clothing as soon as possible. 4. If eye exposure has occurred, eyes must be flushed with lukewarm **water** for at least 15 minutes. 5. Wash exposed skin areas THOROUGHLY with soap and **water**. 6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures. 7. RUSH to a health care facility. Ingestion Exposure: 1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer **oxygen** or other respiratory support. 2. DO NOT induce vomiting or attempt to neutralize! 3. Rinse mouth with large amounts of **water**. Victims should not attempt to swallow this **water**. 4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures. 5. Activated **charcoal** is of no value. 6. Give the victims **water** or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). **Water** or milk should be given only if victims are conscious and alert. 7. RUSH to a health care facility. (EPA, 1998)

U.S. Environmental Protection Agency. 1998. Extremely Hazardous Substances (EHS) Chemical Profiles and Emergency First Aid Guides. Washington, D.C.: U.S. Government Printing Office.

▶ CAMEO Chemicals

Eye: If this chemical in solution contacts the eyes, immediately wash the eyes with large amounts of **water**, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical. If eye tissue is frozen, seek medical attention immediately. If tissue is not frozen, immediately and thoroughly flush the eyes with large amounts of **water** for at least 15 minutes, occasionally lifting the lower and upper eyelids. If irritation, pain, swelling, lacrimation, or photo phobia persist, get medical attention as soon as possible. Skin: If this chemical in solution contacts the skin and frostbite has not occurred, immediately flush the contaminated skin with **water**. If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with **water**. Get medical attention promptly. If frostbite has occurred, seek medical attention immediately; do NOT rub the affected areas or flush with **water**. In order to prevent further tissue damage, do NOT attempt to remove frozen clothing from frostbitten areas. Breathing: If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform mouth-to-mouth resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible. Swallow: If this chemical in solution has been swallowed, get medical attention immediately. (NIOSH, 2016)

National Institute of Occupational Safety and Health. NIOSH Pocket Guide to Chemical Hazards (full website version). <https://www.cdc.gov/niosh/npg> (accessed August 2016).

▶ CAMEO Chemicals

([See procedures](#))

Eye:Irrigate immediately (solution)/Frostbite

Skin:[Water](#) flush immediately (solution)/Frostbite

Breathing:Respiratory support

Swallow:Medical attention immediately (solution)

▶ [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

1.3.2 Inhalation First Aid



Fresh air, rest. Half-upright position. Artificial respiration may be needed. Refer immediately for medical attention.

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

1.3.3 Skin First Aid



Wear protective gloves when administering first aid. First rinse with plenty of [water](#) for at least 15 minutes, then remove contaminated clothes and rinse again. Refer immediately for medical attention.

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

1.3.4 Eye First Aid



Rinse with plenty of [water](#) for several minutes (remove contact lenses if easily possible). Refer immediately for medical attention.

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

1.4 Fire Fighting



Excerpt from ERG Guide 157 [Substances - Toxic and/or Corrosive (Non-Combustible / [Water](#)-Sensitive)]: Note: Some foams will react with the material and release corrosive/toxic gases. SMALL FIRE: CO₂ (except for Cyanides), dry chemical, dry sand, alcohol-resistant foam. LARGE FIRE: [Water](#) spray, fog or alcohol-resistant foam. Move containers from fire area if you can do it without risk. Use [water](#) spray or fog; do not use straight streams. Dike fire-control [water](#) for later disposal; do not scatter the material. FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get [water](#) inside containers. Cool containers with flooding quantities of [water](#) until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. (ERG, 2016)

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2016 Emergency Response Guidebook. <https://www.phmsa.dot.gov/hazmat/outreach-training/erg> (accessed April 26, 2016).

▶ [CAMEO Chemicals](#)

Wear self-contained breathing apparatus and full protective clothing. Neutralize with chemically basic substances such as soda ash or [slaked lime](#). Normal fire fighting procedures may be used. Do not get [water](#) inside containers. Move containers from fire area. Keep containers that are exposed to the fire cool with [water](#) that is sprayed from the side until well after the fire is out. (EPA, 1998)

U.S. Environmental Protection Agency. 1998. *Extremely Hazardous Substances (EHS) Chemical Profiles and Emergency First Aid Guides*. Washington, D.C.: U.S. Government Printing Office.

▶ [CAMEO Chemicals](#)

Excerpt from ERG Guide 125 [Gases - Corrosive]: SMALL FIRE: Dry chemical or CO₂. LARGE FIRE: **Water** spray, fog or regular foam. Move containers from fire area if you can do it without risk. Do not get **water** inside containers. Damaged cylinders should be handled only by specialists. FIRE INVOLVING TANKS: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of **water** until well after fire is out. Do not direct **water** at source of leak or safety devices; icing may occur. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. (ERG, 2016)

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2016 Emergency Response Guidebook. <https://www.phmsa.dot.gov/hazmat/outreach-training/erg> (accessed April 26, 2016).

▶ [CAMEO Chemicals](#)

In case of fire in the surroundings, use appropriate extinguishing media. In case of fire: keep cylinder cool by spraying with **water**. Combat fire from a sheltered position.

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

1.4.1 Fire Fighting Procedures



Suitable extinguishing media: Use **water** spray, alcohol-resistant foam, dry chemical or **carbon dioxide**.

Sigma-Aldrich; Material Safety Data Sheet for Hydrogen chloride. Product Number: 295426, Version 4.8 (Revision Date 2/02/2015). Available from, as of February 25, 2015: <https://www.sigmaldrich.com/safety-center.html>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Advice for firefighters: Wear self-contained breathing apparatus for firefighting if necessary.

Sigma-Aldrich; Material Safety Data Sheet for Hydrogen chloride. Product Number: 295426, Version 4.8 (Revision Date 2/02/2015). Available from, as of February 25, 2015: <https://www.sigmaldrich.com/safety-center.html>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Use **water** spray to keep fire-exposed containers cool. Extinguish fire using agent suitable for surrounding fire. /Hydrogen chloride, anhydrous hydrogen chloride, refrigerated liquid/

National Fire Protection Association; Fire Protection Guide to Hazardous Materials. 14TH Edition, Quincy, MA 2010, p. 49-86

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

If material involved in fire: Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty). Use **water** in flooding quantities as fog. Cool all affected containers with flooding quantities of **water**. Apply **water** from as far a distance as possible. /Hydrochloric acid/

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 475

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Fire Fighting Procedures (Complete) data for HYDROGEN CHLORIDE (6 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.4.2 Firefighting Hazards



Confined fires with high fuel loads of **polyvinyl chloride**, such as a fire in a vault with a high load of **polyvinyl chloride** coated electrical wiring, may generate sufficient hydrogen chloride to cause irritation in fire fighters. Rapid combustion of relatively large amt of polymer may yield ... hydrogen chloride

Clayton, G. D. and F. E. Clayton (eds.). Patty's Industrial Hygiene and Toxicology: Volume 2A, 2B, 2C: Toxicology. 3rd ed. New York: John Wiley Sons, 1981-1982., p. 4303

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.5 Accidental Release Measures



1.5.1 Isolation and Evacuation



Excerpt from ERG Guide 157 [Substances - Toxic and/or Corrosive (Non-Combustible / **Water**-Sensitive)]: As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids. SPILL: Increase, in the downwind direction, as necessary, the isolation distance shown above. FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. (ERG, 2016)

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2016 Emergency Response Guidebook. <https://www.phmsa.dot.gov/hazmat/outreach-training/erg> (accessed April 26, 2016).

▶ [CAMEO Chemicals](#)

Excerpt from ERG Guide 125 [Gases - Corrosive]: As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions. SPILL: See ERG Tables 1 and 3 - Initial Isolation and Protective Action Distances on the UN/NA 1050 datasheet. FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions. (ERG, 2016)

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2016 Emergency Response Guidebook. <https://www.phmsa.dot.gov/hazmat/outreach-training/erg> (accessed April 26, 2016).

▶ [CAMEO Chemicals](#)

Excerpt from ERG Guide 125 [Gases - Corrosive]: As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions. SPILL: See ERG Tables 1 and 3 - Initial Isolation and Protective Action Distances on the UN/NA 2186 datasheet. FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions. (ERG, 2016)

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2016 Emergency Response Guidebook. <https://www.phmsa.dot.gov/hazmat/outreach-training/erg> (accessed April 26, 2016).

▶ [CAMEO Chemicals](#)

1.5.2 Spillage Disposal



Evacuate danger area! Consult an expert! Personal protection: gas-tight chemical protection suit including self-contained breathing apparatus. Ventilation. Remove gas with fine **water** spray.

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

1.5.3 Cleanup Methods



Accidental release measures. Personal precautions, protective equipment and emergency procedures: Wear respiratory protection. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.; Environmental precautions: Prevent further leakage or spillage if safe to do so. Do not let product enter drains.; Methods and materials for containment and cleaning up: Clean up promptly by sweeping or vacuum.

Sigma-Aldrich; Material Safety Data Sheet for Hydrogen chloride. Product Number: 295426, Version 4.8 (Revision Date 2/02/2015). Available from, as of February 25, 2015: <https://www.sigmaaldrich.com/safety-center.html>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

If hydrogen chloride gas is leaked ... 1. Ventilate area of leak to disperse gas. 2. Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair the leak or allow the cylinder to empty. If soln of hydrogen chloride is spilled ... 1. Collect or confine spilled material in the most convenient and safe manner. 2. If possible, reclaim the spilled material. If this is not possible; 3. Dilute and/or neutralize and dispose of in a secured sanitary landfill. /Hydrogen chloride gas/

Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 5

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Spills in **Water**: **Sodium bicarbonate** is recommended as an in situ neutralizing agent. /Hydrochloric acid/

Environment Canada; Tech Info for Problem Spills: Hydrochloric acid (Draft) p.109 (1981)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

During scrubbing (an air pollution control method), **water** is used for removing hydrochloric acid.

Kirk-Othmer Encyclopedia of Chemical Technology. 3rd ed., Volumes 1-26. New York, NY: John Wiley and Sons, 1978-1984., p. 1(78) 655

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Cleanup Methods (Complete) data for HYDROGEN CHLORIDE (7 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.5.4 Disposal Methods



Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste number D002, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste.

40 CFR 240-280, 300-306, 702-799 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of April 2, 2015: <https://www.ecfr.gov>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Product: Contact a licensed professional waste disposal service to dispose of this material. Offer surplus and non-recyclable solutions to a licensed disposal company.

Sigma-Aldrich; Material Safety Data Sheet for Hydrogen chloride. Product Number: 295426, Version 4.8 (Revision Date 2/02/2015). Available from, as of February 25, 2015: <https://www.sigmaaldrich.com/safety-center.html>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Contaminated packaging: Dispose of as unused product.

Sigma-Aldrich; Material Safety Data Sheet for Hydrogen chloride. Product Number: 295426, Version 4.8 (Revision Date 2/02/2015). Available from, as of February 25, 2015: <https://www.sigmaaldrich.com/safety-center.html>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Pesticide disposal: Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance. Container disposal:- Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke. /Emulso Germicidal Bowl Cleaner Disinfectant/

EPA; Pesticide Product Label System (PPLS) - Search Results for Emulso Germicidal Bowl Cleaner Disinfectant. Company no. 9367, product 5. Label approved on April 5, 2002. Available from, as of July 30, 2007: <https://oaspub.epa.gov>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Disposal Methods (Complete) data for HYDROGEN CHLORIDE (6 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.5.5 Preventive Measures



Precautions for safe handling: Avoid contact with skin and eyes. Avoid inhalation of vapor or mist.

Sigma-Aldrich; Material Safety Data Sheet for Hydrogen chloride. Product Number: 295426, Version 4.8 (Revision Date 2/02/2015). Available from, as of February 25, 2015: <https://www.sigmaaldrich.com/safety-center.html>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Appropriate engineering controls: Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Sigma-Aldrich; Material Safety Data Sheet for Hydrogen chloride. Product Number: 295426, Version 4.8 (Revision Date 2/02/2015). Available from, as of February 25, 2015: <https://www.sigmaaldrich.com/safety-center.html>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Sigma-Aldrich; Material Safety Data Sheet for Hydrogen chloride. Product Number: 295426, Version 4.8 (Revision Date 2/02/2015). Available from, as of February 25, 2015: <https://www.sigmaaldrich.com/safety-center.html>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Wear goggles or face shield. Wear protective clothing (long-sleeve shirt and long pants, socks with shoes and chemical resistant gloves such as [water](#) proof gloves. Wash hands before eating, drinking, chewing gum using tobacco or using the toilet. Remove contaminated clothing and wash clothing before reuse. /Emulso Germicidal Bowl Cleaner Disinfectant/

EPA; Pesticide Product Label System (PPLS) - Search Results for Emulso Germicidal Bowl Cleaner Disinfectant. Company no. 9367, product 5. Label approved on April 5, 2002. Available from, as of July 30, 2007: <https://oaspub.epa.gov>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Preventive Measures (Complete) data for HYDROGEN CHLORIDE (19 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.6 Handling and Storage



1.6.1 Nonfire Spill Response



Excerpt from ERG Guide 157 [Substances - Toxic and/or Corrosive (Non-Combustible / [Water](#)-Sensitive)]: ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. A vapor-suppressing foam may be used to reduce vapors. DO NOT GET [WATER](#) INSIDE CONTAINERS. Use [water](#) spray to reduce vapors or divert vapor cloud drift. Avoid allowing [water](#) runoff to contact spilled material. Prevent entry into waterways, sewers, basements or confined areas. SMALL SPILL: Cover with DRY earth, DRY sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain. Use clean, non-sparking tools to collect material and place it into loosely covered plastic containers for later disposal. (ERG, 2016)

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2016 Emergency Response Guidebook. <https://www.phmsa.dot.gov/hazmat/outreach-training/erg> (accessed April 26, 2016).

▶ [CAMEO Chemicals](#)

Excerpt from ERG Guide 125 [Gases - Corrosive]: Fully encapsulating, vapor-protective clothing should be worn for spills and leaks with no fire. Do not touch or walk through spilled material. Stop leak if you can do it without risk. If possible, turn leaking containers so that gas escapes rather than liquid. Prevent entry into waterways, sewers, basements or confined areas. Do not direct [water](#) at spill or source of leak. Use [water](#) spray to reduce vapors or divert vapor cloud drift. Avoid allowing [water](#) runoff to contact spilled material. Isolate area until gas has dispersed. (ERG, 2016)

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2016 Emergency Response Guidebook. <https://www.phmsa.dot.gov/hazmat/outreach-training/erg> (accessed April 26, 2016).

▶ [CAMEO Chemicals](#)

1.6.2 Safe Storage



Cool. Fireproof if in building. Separated from food and feedstuffs and incompatible materials. See Chemical Dangers. Keep in a well-ventilated room.

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

1.6.3 Storage Conditions



Keep container tightly closed in a dry and well-ventilated place. Storage class (TRGS 510): Gases

Sigma-Aldrich; Material Safety Data Sheet for Hydrogen chloride. Product Number: 295426, Version 4.8 (Revision Date 2/02/2015). Available from, as of February 25, 2015: <https://www.sigmaaldrich.com/safety-center.html>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Store in cool, dry, well-ventilated location. Separate from oxidizing materials, organic materials, and alkalis.
/Hydrogen chloride, anhydrous hydrogen chloride, refrigerated liquid/

National Fire Protection Association; Fire Protection Guide to Hazardous Materials. 14TH Edition, Quincy, MA 2010, p. 49-87

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Store in a dry place no lower in temperature than 50 °F or higher than 120 °F. /Emulso Germicidal Bowl Cleaner Disinfectant/

EPA; Pesticide Product Label System (PPLS) - Search Results for Emulso Germicidal Bowl Cleaner Disinfectant. Company no. 9367, product 5. Label approved on April 5, 2002. Available from, as of July 30, 2007: <https://oaspub.epa.gov>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

The acid should not be stored in the vicinity of flammable or oxidizing substances, eg [nitric acid](#) or chlorates, or near metals and metal hydrides that may be attacked by the acid ... Electrical equipment should be flameproof and protected against corrosive action. ... /Hydrochloric acid/

International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 1085

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Storage Conditions (Complete) data for HYDROGEN CHLORIDE (6 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.7 Exposure Control and Personal Protection [?](#) [↗](#)

1.7.1 Recommended Exposure Limit (REL) [?](#) [↗](#)

REL-C (Ceiling)

5 ppm (7 mg/m³)

▶ [Occupational Safety and Health Administration \(OSHA\)](#)

C 5 ppm (7 mg/m³)

▶ [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

1.7.2 Permissible Exposure Limit (PEL) [?](#) [↗](#)

PEL-C (Ceiling)

5 ppm (7 mg/m³)

▶ [Occupational Safety and Health Administration \(OSHA\)](#)

CAPEL-TWA (California PEL - Time Weighted Average)

0.3 ppm (0.45 mg/m³)

- ▶ Occupational Safety and Health Administration (OSHA)

CAPEL-C (California PEL - Ceiling)

2 ppm

- ▶ Occupational Safety and Health Administration (OSHA)

C 5 ppm (7 mg/m³)

- ▶ The National Institute for Occupational Safety and Health (NIOSH)

1.7.3 Immediately Dangerous to Life or Health (IDLH)



50 ppm (NIOSH, 2016)

National Institute of Occupational Safety and Health. NIOSH Pocket Guide to Chemical Hazards (full website version). <https://www.cdc.gov/niosh/npg> (accessed August 2016).

- ▶ CAMEO Chemicals

50 ppm

NIOSH. NIOSH Pocket Guide to Chemical Hazards. Department of Health & Human Services, Centers for Disease Control & Prevention. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2010-168 (2010). Available from: <https://www.cdc.gov/niosh/npg>

- ▶ Hazardous Substances Data Bank (HSDB); Occupational Safety and Health Administration (OSHA)

50 ppm

See: [7647010](#)

- ▶ The National Institute for Occupational Safety and Health (NIOSH)

1.7.4 Threshold Limit Values (TLV)



Ceiling Limit: 2 ppm.

American Conference of Governmental Industrial Hygienists. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. ACGIH, Cincinnati, OH 2014, p. 35

- ▶ Hazardous Substances Data Bank (HSDB)

A4; Not classifiable as a human carcinogen.

American Conference of Governmental Industrial Hygienists. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. ACGIH, Cincinnati, OH 2014, p. 35

- ▶ Hazardous Substances Data Bank (HSDB)

2 ppm as STEL; A4 (not classifiable as a human carcinogen).

- ▶ ILO International Chemical Safety Cards (ICSC)

3.0 mg/m³, 2 ppm; peak limitation category: I(2); pregnancy risk group: C.

- ▶ ILO International Chemical Safety Cards (ICSC)

TLV-C (Ceiling)

2 ppm [2000]

- ▶ [Occupational Safety and Health Administration \(OSHA\)](#)

1.7.5 Other Standards Regulations and Guidelines



AEGLs

Table: AEGLs for HYDROGEN CHLORIDE (ppm)

Exposure Time	AEGL 1 (Discomfort)	AEGL 2 (Impaired Escape)	AEGL 3 (Life Threatening/Death)
10 minutes	1.8	100	620
30 minutes	1.8	43	210
1 hour	1.8	22	100
4 hours	1.8	11	26
8 hours	1.8	11	26

U.S. EPA; *Acute Exposure Guideline Levels (AEGLs) - Results for Hydrogen Chloride*. Available from, as of August 5, 2009: <https://www.epa.gov/oppt/aegl/pubs/chemlist.htm>

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Emergency Response Planning Guidelines (ERPG): ERPG(1) 3 ppm (no more than mild, transient effects) for up to 1 hr exposure. Odor should be detectable near ERPG-1.; ERPG(2) 20 ppm (without serious, adverse effects) for up to 1 hr exposure; ERPG(3) 150 ppm (not life threatening) up to 1 hr exposure.

2014 Emergency Response Planning Guidelines (ERPG) & Workplace Exposure Level (WEEL). American Industrial Hygiene Association, Falls Church, VA 2014, p. 26

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Australia: peak limitation 5 ppm (1990); Federal Republic of Germany: 5 ppm, short-term level 10 ppm, 5 min, 8 times per shift, Pregnancy group C, no reason to fear a risk of damage to the developing embryo or fetus when MAK or BAT values are adhered to (1991); Sweden: ceiling value 5 ppm (1989); United Kingdom: 10-min STEL 5 ppm (1991).

American Conference of Governmental Industrial Hygienists, Inc. Documentation of the Threshold Limit Values and Biological Exposure Indices. 6th ed. Volumes I, II, III. Cincinnati, OH: ACGIH, 1991., p. 774

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.7.6 Inhalation Risk



A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

- ▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

1.7.7 Effects of Short Term Exposure



Rapid evaporation of the liquid may cause frostbite. The substance is corrosive to the eyes, skin and respiratory tract. Inhalation of this gas may cause asthma-like reactions (RADS). Exposure could cause asphyxiation due to swelling in the throat. Inhalation of high concentrations may cause lung oedema, but only after initial corrosive effects on the

eyes and the upper respiratory tract have become manifest. Inhalation of high concentrations may cause pneumonitis.

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

1.7.8 Effects of Long Term Exposure



Repeated or prolonged inhalation may cause effects on the teeth. This may result in tooth erosion. The substance may have effects on the upper respiratory tract and lungs. This may result in chronic inflammation of the respiratory tract and reduced lung function. Mists of this strong inorganic acid are carcinogenic to humans.

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

1.7.9 Allowable Tolerances



Residues of hydrochloric acid are exempted from the requirement of a tolerance when used as a solvent, neutralizer in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to growing crops or to raw agricultural commodities after harvest.

40 CFR 180.910 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 4, 2015: <https://www.ecfr.gov>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.7.10 Personal Protective Equipment (PPE)



Skin: If chemical is in solution, wear appropriate personal protective clothing to prevent skin contact and to prevent skin from becoming frozen from contact with the liquid or from contact with vessels containing the liquid. **Eyes:** Wear appropriate eye protection to prevent eye contact with the liquid that could result in burns or tissue damage from frostbite. **Wash skin:** If the chemical is in solution, the worker should immediately wash the skin when it becomes contaminated. **Remove:** If chemical is in solution, work clothing that becomes wet or significantly contaminated should be removed and replaced. **Change:** No recommendation is made specifying the need for the worker to change clothing after the work shift. **Provide:** Eyewash fountains should be provided (when chemical is in solution) in areas where there is any possibility that workers could be exposed to the substance; this is irrespective of the recommendation involving the wearing of eye protection. Facilities for quickly drenching the body should be provided (when chemical is in solution) within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities provide a sufficient quantity or flow of **water** to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of **water** from a sink or hose could be considered adequate.] Quick drench facilities and/or eyewash fountains should be provided within the immediate work area for emergency use where there is any possibility of exposure to liquids that are extremely cold or rapidly evaporating. (NIOSH, 2016)

National Institute of Occupational Safety and Health. NIOSH Pocket Guide to Chemical Hazards (full website version). <https://www.cdc.gov/niosh/npg> (accessed August 2016).

▶ [CAMEO Chemicals](#)

Eye/face protection: Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Sigma-Aldrich; Material Safety Data Sheet for Hydrogen chloride. Product Number: 295426, Version 4.8 (Revision Date 2/02/2015). Available from, as of February 25, 2015: <https://www.sigmaaldrich.com/safety-center.html>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Handle with gloves.

Sigma-Aldrich; Material Safety Data Sheet for Hydrogen chloride. Product Number: 295426, Version 4.8 (Revision Date 2/02/2015). Available from, as of February 25, 2015: <https://www.sigmaaldrich.com/safety-center.html>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Body Protection: Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Sigma-Aldrich; Material Safety Data Sheet for Hydrogen chloride. Product Number: 295426, Version 4.8 (Revision Date 2/02/2015). Available from, as of February 25, 2015: <https://www.sigmaaldrich.com/safety-center.html>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Respiratory protection: Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Sigma-Aldrich; Material Safety Data Sheet for Hydrogen chloride. Product Number: 295426, Version 4.8 (Revision Date 2/02/2015). Available from, as of February 25, 2015: <https://www.sigmaaldrich.com/safety-center.html>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Personal Protective Equipment (PPE) (Complete) data for HYDROGEN CHLORIDE (24 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

([See protection codes](#))

Skin:Prevent skin contact (solution)/Frostbite

Eyes:Prevent eye contact/Frostbite

Wash skin:When contaminated (solution)

Remove:When wet or contaminated (solution)

Change:No recommendation

Provide:Eyewash (solution), Quick drench (solution), Frostbite wash

▶ [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

1.7.11 Respirator Recommendations



NIOSH/OSHA

Up to 50 ppm:

(APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern*

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern

(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern*

(APF = 10) Any supplied-air respirator*

(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister

Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection

- ▶ [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

1.7.12 Exposure Prevention



AVOID ALL CONTACT! IN ALL CASES CONSULT A DOCTOR!

- ▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

1.7.13 Inhalation Prevention



Use ventilation, local exhaust or breathing protection.

- ▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

1.7.14 Skin Prevention



Cold-insulating gloves. Protective clothing.

- ▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

1.7.15 Eye Prevention



Wear face shield or eye protection in combination with breathing protection.

- ▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

1.8 Stability and Reactivity



1.8.1 Air and Water Reactions



An aqueous solution. Dilution may generate heat. Fumes in air.

- ▶ [CAMEO Chemicals](#)

Fumes strongly in moist air, generating corrosive hydrochloric acid vapors. Soluble in [water](#) with evolution of heat.

▶ [CAMEO Chemicals](#)

Fumes in air as vapors boil away. Very soluble in [water](#) to give hydrochloric acid. Rapid mixing with [water](#) generates heat that drives off considerable gaseous hydrogen chloride.

▶ [CAMEO Chemicals](#)

1.8.2 Reactive Group



Acids, Strong Non-oxidizing

[Water](#) and Aqueous Solutions

▶ [CAMEO Chemicals](#)

Acids, Strong Non-oxidizing

▶ [CAMEO Chemicals](#)

1.8.3 Reactivity Alerts



Known Catalytic Activity

▶ [CAMEO Chemicals](#)

Known Catalytic Activity

Water-Reactive

▶ [CAMEO Chemicals](#)

1.8.1 CSL Reaction Information



CSL No	CSL00043
Reactants/Reagents	FORMALDEHYDE ; PARAFORMALDEHYDE ; HCl gas; HYDROCHLORIC ACID
Reaction Class	Chlorination
Function Group	ALDEHYDE
GHS Category	Harmful, Toxic
Warning Message	Generation of bis(chloromethyl) ether (potent carcinogen)
Source Reference	User-Reported
CSL Status	Approved
Modified Date	5/31/2018

▶ [Pistoia Alliance Chemical Safety Library](#)

1.8.4 Reactivity Profile



HYDROCHLORIC ACID is an aqueous solution of hydrogen chloride, an acidic gas. Reacts exothermically with organic bases (amines, amides) and inorganic bases (oxides and hydroxides of metals). Reacts exothermically with carbonates (including limestone and building materials containing limestone) and hydrogen carbonates to generate [carbon dioxide](#). Reacts with sulfides, carbides, borides, and phosphides to generate toxic or flammable gases. Reacts with many metals (including [aluminum](#), [zinc](#), [calcium](#), [magnesium](#), [iron](#), [tin](#) and all of the alkali metals) to generate flammable [hydrogen](#) gas. Reacts violently with [acetic anhydride](#), [2-aminoethanol](#), [ammonium hydroxide](#), calcium phosphide, [chlorosulfonic acid](#), [1,1-difluoroethylene](#), [ethylenediamine](#), [ethyleneimine](#), [oleum](#), [perchloric acid](#), b-propiolactone, [propylene oxide](#), [silver perchlorate/carbon tetrachloride](#) mixture, [sodium hydroxide](#), uranium(IV) phosphide, [vinyl acetate](#), calcium carbide, rubidium carbide, cesium acetylide, rubidium acetylide, [magnesium boride](#), [mercury\(II\) sulfate](#) [Lewis]. Mixtures with concentrated [sulfuric acid](#) can evolve toxic hydrogen chloride gas at a dangerous rate. Undergoes a very energetic reaction with calcium phosphide [Mellor 8:841(1946-1947)].

▶ [CAMEO Chemicals](#)

ANHYDROUS HYDROGEN CHLORIDE is an anhydrous (no [water](#)) strong acid. Reacts rapidly and exothermically with bases of all kinds (including amines and amides). Reacts exothermically with carbonates (including limestone and building materials containing limestone) and hydrogen carbonates to generate [carbon dioxide](#). Reacts with sulfides, carbides, borides, and phosphides to generate toxic or flammable gases. Reacts with many metals (including [aluminum](#), [zinc](#), [calcium](#), [magnesium](#), [iron](#), [tin](#) and all of the alkali metals) to generate flammable [hydrogen](#) gas. Reacts violently with [acetic anhydride](#), [2-aminoethanol](#), [ammonium hydroxide](#), calcium phosphide, [chlorosulfonic acid](#), [1,1-difluoroethylene](#), [ethylenediamine](#), [ethyleneimine](#), [oleum](#), [perchloric acid](#), b-propiolactone, [propylene oxide](#), [silver perchlorate/carbon tetrachloride](#) mixture, [sodium hydroxide](#), uranium(IV) phosphide, [vinyl acetate](#), calcium carbide, rubidium carbide, cesium acetylide, rubidium acetylide, [magnesium boride](#), [mercury\(II\) sulfate](#) [Lewis]. Undergoes a very energetic reaction with calcium phosphide [Mellor 8:841(1946-1947)]. Corrosive to metals and tissues and irritating to the eyes and respiratory system. Corrodes galvanized or [copper](#)-alloy metals (brass, bronze); fittings of stainless steel or mild or cast steel must therefore be used. Reacts with calcium carbide with incandescence [Mellor 5:862(1946-1947)]. Absorption on [mercuric sulfate](#) becomes violent at 125°C. [Mellor 2, Supp. 1:462(1956)].

▶ [CAMEO Chemicals](#)

HYDROGEN CHLORIDE, REFRIGERATED LIQUID is an anhydrous (no [water](#)) strong acid. Reacts rapidly and exothermically with bases of all kinds (including amines and amides). Reacts exothermically with carbonates (including limestone and building materials containing limestone) and hydrogen carbonates to generate [carbon dioxide](#). Reacts with sulfides, carbides, borides, and phosphides to generate toxic or flammable gases. Reacts with many metals (including [aluminum](#), [zinc](#), [calcium](#), [magnesium](#), [iron](#), [tin](#) and all of the alkali metals) to generate flammable [hydrogen](#) gas. Reacts violently with [acetic anhydride](#), [2-aminoethanol](#), [ammonium hydroxide](#), calcium phosphide, [chlorosulfonic acid](#), [1,1-difluoroethylene](#), [ethylenediamine](#), [ethyleneimine](#), [oleum](#), [perchloric acid](#), b-propiolactone, [propylene oxide](#), [silver perchlorate/carbon tetrachloride](#) mixture, [sodium hydroxide](#), uranium(IV) phosphide, [vinyl acetate](#), calcium carbide, rubidium carbide, cesium acetylide, rubidium acetylide, [magnesium boride](#), [mercury\(II\) sulfate](#) [Lewis]. Undergoes a very energetic reaction with calcium phosphide [Mellor 8:841(1946-1947)]. Corrosive to metals and tissues and irritating to the eyes and respiratory system. Corrodes galvanized or [copper](#)-alloy metals (brass, bronze); fittings of stainless steel or mild or cast steel must therefore be used. Contact between the cold liquid and [water](#) may result in vigorous or violent boiling and rapid vaporization. If the [water](#) is hot, a liquid "superheat" explosion may occur [Handling Chemicals Safely 1980].

▶ [CAMEO Chemicals](#)

1.8.5 Hazardous Reactivities and Incompatibilities



The aqueous solution is a strong acid. Corrosive fumes emitted on contact with air. Reacts violently with bases, oxidizers forming toxic **chlorine** gas. Reacts, often violently, with **acetic anhydride**, active metals, aliphatic amines, alkanolamines, alkylene oxides, aromatic amines, amides, **2-aminoethanol**, **ammonia**, **ammonium hydroxide**, calcium phosphide, **chlorosulfonic acid**, **ethylene diamine**, **ethyleneimine**, **epichlorohydrin**, isocyanates, metal acetylides, **oleum**, organic anhydrides, **perchloric acid**, **3-propiolactone**, **uranium phosphide**, **sulfuric acid**, **vinyl acetate**, **vinylidene fluoride**. Highly corrosive to most metals, forming flammable **hydrogen** gas. Attacks some plastics, rubber, and coatings.

Pohanish, R.P. (ed). Sittig's Handbook of Toxic and Hazardous Chemical Carcinogens 6th Edition Volume 1: A-K, Volume 2: L-Z. William Andrew, Waltham, MA 2012, p. 1465

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Hydrochloric acid and hydrogen chloride react violently with many metals, with the generation of highly flammable **hydrogen** gas, which may explode. Reaction with oxidizers such as permanganates, chlorates, chlorites, and hypochlorites may produce **chlorine** or **bromine** gas.

National Research Council. Prudent Practices in the Laboratory. Handling and Disposal of Chemicals. Washington, DC: National Academy Press, 1995., p. 333

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Anhydrous hydrogen chloride is rapidly absorbed in **water** to form corrosive hydrochloric acid. Aqueous hydrochloric acid solutions are quite reactive. Reacts vigorously with alkalis and with many organic materials. Strong oxidizing materials cause release of **chlorine**. /Hydrogen chloride, anhydrous hydrogen chloride, refrigerated liquid/

National Fire Protection Association; Fire Protection Guide to Hazardous Materials. 14TH Edition, Quincy, MA 2010, p. 49-86

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Cesium acetylene carbide burns in hydrogen chloride gas.

National Fire Protection Association; Fire Protection Guide to Hazardous Materials. 14TH Edition, Quincy, MA 2010, p. 491-47

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Hazardous Reactivities and Incompatibilities (Complete) data for HYDROGEN CHLORIDE (23 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.9 Transport Information



1.9.1 DOT Emergency Guidelines



If ... THERE IS NO FIRE, go directly to the Table of Initial Isolation and Protective Action Distances /(see table below)/ ... to obtain initial isolation and protective action distances. IF THERE IS A FIRE, or IF A FIRE IS INVOLVED, go directly to the appropriate guide /(see guide(s) below)/ and use the evacuation information shown under PUBLIC SAFETY. /Hydrogen chloride, anhydrous/

Table: Table of Initial Isolation and Protective Action Distances for Hydrogen chloride, anhydrous ID: 1050

Small Spills (from a small package or small leak from a large package)	Small Spills (from a small package or small leak from a large package)	Small Spills (from a small package or small leak from a large package)	Large Spills (from a large package or small leak from a large package)	Large Spills (from a large package or small leak from a large package)	Large Spills (from a large package or small leak from a large package)

First ISOLATE in all Directions	Then PROTECT persons Downwind during DAY:	Then PROTECT persons Downwind during NIGHT:	First ISOLATE in all Directions	Then PROTECT persons Downwind during DAY:	Then PROTECT persons Downwind during NIGHT:
30 m (100 ft)	0.1 km (0.1 mi)	0.3 km (0.2 mi)	60 m (200 ft)	0.3 km (0.2 mi)	1.3 km (0.8 mi)

U.S. Department of Transportation. 2012 Emergency Response Guidebook. Washington, D.C. 2012

► [Hazardous Substances Data Bank \(HSDB\)](#)

If ... THERE IS NO FIRE, go directly to the Table of Initial Isolation and Protective Action Distances /(see table below)/ ... to obtain initial isolation and protective action distances. IF THERE IS A FIRE, or IF A FIRE IS INVOLVED, go directly to the appropriate guide /(see guide(s) below)/ and use the evacuation information shown under PUBLIC SAFETY.
/Hydrogen chloride: Large Spills/

Table: Table of Initial Isolation and Protective Action Distances For Different Quantities in Hydrogen chloride: Large Spills ID:1050

TRANSPORT CONTAINER	First ISOLATE in all Directions	Then PROTECT persons downwind during	Then PROTECT persons downwind during	Then PROTECT persons downwind during	Then PROTECT persons downwind during	Then PROTECT persons downwind during	Then PROTECT persons downwind during
TRANSPORT CONTAINER	First ISOLATE in all Directions	DAY	DAY	DAY	NIGHT	NIGHT	NIGHT
TRANSPORT CONTAINER	First ISOLATE in all Directions	Low Wind (<6 mph= <10 km/h)	Moderate wind (6-12 mph = 10-20 km/hr)	High wind (>12 mph = >20 km/hr)	Low Wind (<6 mph= <10 km/h)	Moderate wind (6-12 mph = 10-20 km/hr)	High wind (>12 mph = >20 km/hr)
Rail tank car	600 m (2000 ft)	6.1 km (3.8 mi)	2.3 km (1.4 mi)	1.8 km (1.1 mi)	11+ km (7+ mi)	4 km (2.5 mi)	2.6 km (1.6 mi)
Highway tank truck or trailer	300 m (1000 ft)	3.1 km (1.9 mi)	1.1 km (0.7 mi)	0.8 km (0.5 mi)	7.4 km (4.6 mi)	2.1 km (1.3 mi)	1 km (0.6 mi)
Multiple ton cylinders	60 m (200 ft)	0.6 km (0.4 mi)	0.3 km (0.2 mi)	0.2 km (0.1 mi)	1.8 km (1.1 mi)	0.3 km (0.2 mi)	0.2 km (0.1 mi)
Multiple small cylinders or single ton cylinder	45 m (150 ft)	0.5 km (0.3 mi)	0.2 km (0.1 mi)	0.2 km (0.1 mi)	1.5 km (0.9 mi)	0.3 km (0.2 mi)	0.2 km (0.1 mi)

U.S. Department of Transportation. 2012 Emergency Response Guidebook. Washington, D.C. 2012

► [Hazardous Substances Data Bank \(HSDB\)](#)

If ... THERE IS NO FIRE, go directly to the Table of Initial Isolation and Protective Action Distances /(see table below)/ ... to obtain initial isolation and protective action distances. IF THERE IS A FIRE, or IF A FIRE IS INVOLVED, go directly to the appropriate guide /(see guide(s) below)/ and use the evacuation information shown under PUBLIC SAFETY.
/Hydrogen chloride, refrigerated liquid/

Table: Table of Initial Isolation and Protective Action Distances for Hydrogen chloride, refrigerated liquid ID: 2186

Small Spills (from a small package or small leak from a large package)	Small Spills (from a small package or small leak from a large package)	Small Spills (from a small package or small leak from a large package)	Large Spills (from a large package or small leak from a large package)	Large Spills (from a large package or small leak from a large package)	Large Spills (from a large package or small leak from a large package)
First ISOLATE in all Directions	Then PROTECT persons Downwind during DAY:	Then PROTECT persons Downwind during NIGHT:	First ISOLATE in all Directions	Then PROTECT persons Downwind during DAY:	Then PROTECT persons Downwind during NIGHT:

30 m (100 ft) 0.1 km (0.1 mi) 0.3 km (0.2 mi) 300 m (1000 ft) 2.0 km (1.3 mi) 7.6 km (4.7 mi)

U.S. Department of Transportation. 2012 Emergency Response Guidebook. Washington, D.C. 2012

► [Hazardous Substances Data Bank \(HSDB\)](#)

If ... THERE IS NO FIRE, go directly to the Table of Initial Isolation and Protective Action Distances /(see table below)/ ... to obtain initial isolation and protective action distances. IF THERE IS A FIRE, or IF A FIRE IS INVOLVED, go directly to the appropriate guide /(see guide(s) below)/ and use the evacuation information shown under PUBLIC SAFETY.

/Hydrogen chloride,refrigerated liquid:Large Spills/

Table: Table of Initial Isolation and Protective Action Distances For Different Quantities in Hydrogen chloride,refrigerated liquid:Large Spills ID:2186

TRANSPORT CONTAINER	First ISOLATE in all Directions	Then PROTECT persons downwind during	Then PROTECT persons downwind during	Then PROTECT persons downwind during	Then PROTECT persons downwind during	Then PROTECT persons downwind during	Then PROTECT persons downwind during
TRANSPORT CONTAINER	First ISOLATE in all Directions	DAY	DAY	DAY	NIGHT	NIGHT	NIGHT
TRANSPORT CONTAINER	First ISOLATE in all Directions	Low Wind (<6 mph= <10 km/h)	Moderate wind (6-12 mph = 10-20 km/hr)	High wind (>12 mph = >20 km/hr)	Low Wind (<6 mph= <10 km/h)	Moderate wind (6-12 mph = 10-20 km/hr)	High wind (>12 mph = >20 km/hr)
Rail tank car	600 m (2000 ft)	6.1 km (3.8 mi)	2.3 km (1.4 mi)	1.8 km (1.1 mi)	11+ km (7+ mi)	4 km (2.5 mi)	2.6 km (1.6 mi)
Highway tank truck or trailer	300 m (1000 ft)	3.1 km (1.9 mi)	1.1 km (0.7 mi)	0.8 km (0.5 mi)	7.4 km (4.6 mi)	2.1 km (1.3 mi)	1 km (0.6 mi)
Multiple ton cylinders	60 m (200 ft)	0.6 km (0.4 mi)	0.3 km (0.2 mi)	0.2 km (0.1 mi)	1.8 km (1.1 mi)	0.3 km (0.2 mi)	0.2 km (0.1 mi)
Multiple small cylinders or single ton cylinder	45 m (150 ft)	0.5 km (0.3 mi)	0.2 km (0.1 mi)	0.2 km (0.1 mi)	1.5 km (0.9 mi)	0.3 km (0.2 mi)	0.2 km (0.1 mi)

U.S. Department of Transportation. 2012 Emergency Response Guidebook. Washington, D.C. 2012

► [Hazardous Substances Data Bank \(HSDB\)](#)

For more DOT Emergency Guidelines (Complete) data for HYDROGEN CHLORIDE (20 total), please visit the [HSDB record page](#).

► [Hazardous Substances Data Bank \(HSDB\)](#)

1.9.2 DOT ID and Guide



1050 125

► [DOT Emergency Response Guidebook](#)

1789 157

► [DOT Emergency Response Guidebook](#)

[1050 125 \(anhydrous\)](#)

[1789 157 \(solution\)](#)

- ▶ [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

1.9.3 Shipping Name/ Number DOT/UN/NA/IMO



UN 1050; Hydrogen chloride, anhydrous

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

UN 1789; Hydrochloric acid

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

UN 2186; Hydrogen chloride, refrigerated liquid.

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

IMO 8; Hydrochloric acid

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

IMO 2.3; Hydrogen chloride, anhydrous; Hydrogen chloride, refrigerated liquid

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.9.4 Standard Transportation Number



49 042 70; Hydrochloric acid, anhydrous

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

49 302 28; Hydrochloric (muriatic) acid

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

49 302 31; Hydrochloric acid (muriatic acid, spent)

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

49 302 29; Hydrochloric acid mixture

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

49 302 30; Hydrochloric acid solution, inhibited

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.9.5 Shipment Methods and Regulations



No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./

49 CFR 171.2 (USDOT); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 17, 2015: <https://www.ecfr.gov>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials.

International Air Transport Association. *Dangerous Goods Regulations. 55th Edition. Montreal, Quebec Canada. 2014., p. 253, 254*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article.

International Maritime Organization. *IMDG Code. International Maritime Dangerous Goods Code Volume 2 2012, p. 46, 89, 105*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.9.6 DOT Label



Corrosive

▶ [CAMEO Chemicals](#)

Poison Gas Corrosive

▶ [CAMEO Chemicals](#)

1.9.7 EC Classification



Symbol: T, C; R: 23-35; S: (1/2)-9-26-36/37/39-45

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

1.9.8 UN Classification



UN Hazard Class: 2.3; UN Subsidiary Risks: 8

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

1.10 Regulatory Information



1.10.1 Atmospheric Standards



Listed as a hazardous air pollutant (HAP) generally known or suspected to cause serious health problems. The Clean Air Act, as amended in 1990, directs EPA to set standards requiring major sources to sharply reduce routine emissions of toxic pollutants. EPA is required to establish and phase in specific performance based standards for all air emission sources that emit one or more of the listed pollutants. Hydrochloric acid is included on this list.

Clean Air Act as amended in 1990, Sect. 112 (b) (1) Public Law 101-549 Nov. 15, 1990

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.10.2 Clean Water Act Requirements



Hydrochloric acid is designated as a hazardous substance under section 311(b)(2)(A) of the Federal [Water](#) Pollution Control Act and further regulated by the Clean [Water](#) Act Amendments of 1977 and 1978. These regulations apply to discharges of this substance. This designation includes any isomers and hydrates, as well as any solutions and mixtures containing this substance.

40 CFR 116.4; U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 4, 2015: <https://www.ecfr.gov>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.10.3 CERCLA Reportable Quantities



Releases of CERCLA hazardous substances are subject to the release reporting requirement of CERCLA section 103, codified at 40 CFR part 302, in addition to the requirements of 40 CFR part 355. Hydrogen chloride (gas only) is an extremely hazardous substance (EHS) subject to reporting requirements when stored in amounts in excess of its threshold planning quantity (TPQ) of 500 lbs. /Gas form only/

40 CFR 355 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 4, 2015: <https://www.ecfr.gov>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Persons in charge of vessels or facilities are required to notify the National Response Center (NRC) immediately, when there is a release of this designated hazardous substance, in an amount equal to or greater than its reportable quantity of 5000 lb or 2270 kg. The toll free number of the NRC is (800) 424-8802. The rule for determining when notification is required is stated in 40 CFR 302.4 (section IV. D.3.b).

40 CFR 302.4 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 4, 2015: <https://www.ecfr.gov>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.10.4 RCRA Requirements



D002; A solid waste containing hydrochloric acid may become characterized as a hazardous waste when subjected to testing for corrosivity as stipulated in 40 CFR 261.21, and if so characterized, must be managed as a hazardous waste.

40 CFR 261.22 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 4, 2015: <https://www.ecfr.gov>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.10.5 FIFRA Requirements



Residues of hydrochloric acid are exempted from the requirement of a tolerance when used as a solvent, neutralizer in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to growing crops or to raw agricultural commodities after harvest.

40 CFR 180.910 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 4, 2015: <https://www.ecfr.gov>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Based on the reviews of the generic data for the active ingredients mineral acids /including hydrochloric acid/, the Agency has sufficient information on the health effects of mineral acids and on its potential for causing adverse effects in fish and wildlife and the environment. Therefore, the Agency concludes that products, labeled and used as specified in this Reregistration Eligibility Decision, containing mineral acids for all uses except for the use of **sulfuric acid** on potato vines, are eligible for reregistration.

USEPA/Office of Prevention, Pesticides and Toxic Substances; Reregistration Eligibility Decision Document for Mineral Acids p.22 EPA 738-F-93-025 (December 1993). Available from, as of February 24, 2015: <https://www.epa.gov/pesticides/reregistration/status.htm>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

As the federal pesticide law FIFRA directs, EPA is conducting a comprehensive review of older pesticides to consider their health and environmental effects and make decisions about their continued use. Under this pesticide reregistration program, EPA examines newer health and safety data for pesticide active ingredients initially registered before November 1, 1984, and determines whether the use of the pesticide does not pose unreasonable risk in accordance to newer safety standards, such as those described in the Food Quality Protection Act of 1996. Pesticides for which EPA had not issued Registration Standards prior to the effective date of FIFRA '88 were divided into three lists based upon their potential for human exposure and other factors, with List B containing pesticides of greater concern than those on List C, and with List C containing pesticides of greater concern than those on List D. Hydrogen chloride is found on List D. Case No: 4064; Pesticide type: fungicide, herbicide, antimicrobial; Case Status: RED Approved 02/94; OPP has made a decision that some/all uses of the pesticide are eligible for reregistration, as reflected in a Reregistration Eligibility Decision (RED) document .; Active ingredient (AI): hydrogen chloride; AI Status: OPP has completed a Reregistration Eligibility Decision (RED) document for the case/AI.

United States Environmental Protection Agency/ Prevention, Pesticides and Toxic Substances; Status of Pesticides in Registration, Reregistration, and Special Review. (1998) EPA 738-R-98-002, p. 324

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.10.6 FDA Requirements



Hydrochloric acid used as a buffer and neutralizing agent in animal drugs, feeds, and related products is generally recognized as safe when used in accordance with good manufacturing or feeding practice.

21 CFR 582.1057 (USFDA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 4, 2015: <https://www.ecfr.gov>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

This substance is generally recognized as safe when used as a buffer and neutralizing agent in accordance with good manufacturing practice.

21 CFR 182.1057 (USFDA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 4, 2015: <https://www.ecfr.gov>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Drug products containing certain active ingredients offered over-the-counter (OTC) for certain uses. A number of active ingredients have been present in OTC drug products for various uses, as described below. However, based on evidence currently available, there are inadequate data to establish general recognition of the safety and effectiveness of these ingredients for the specified uses: hydrochloric acid is included in digestive aid drug products.

21 CFR 310.545 (a)(8) (USFDA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 4, 2015: <https://www.ecfr.gov>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.11 Other Safety Information



1.11.1 Toxic Combustion Products



Special hazards arising from the substance or mixture: Hydrogen chloride gas

Sigma-Aldrich; Material Safety Data Sheet for Hydrogen chloride. Product Number: 295426, Version 4.8 (Revision Date 2/02/2015). Available from, as of February 25, 2015: <https://www.sigmaaldrich.com/safety-center.html>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.11.2 History and Incidents



In May 2006, approximately 5,000 gallons of hydrochloric acid were released in St. Paul, Minnesota (2000 population: 287,151), from a stationary rail tanker at a chemical wholesaler. The rubber liner in the tanker had become displaced, allowing the acid to corrode and rupture the bottom of the tanker. A vapor cloud drifted from the site, and approximately 150 gallons of acid traveled through a storm sewer to a nearby river. Hydrochloric acid can cause skin, eye, and respiratory irritation; burns; and pulmonary edema (3). Seven persons were reported injured after contact with the vapor cloud: six members of the general public and one employee of the wholesaler. The most common injuries were respiratory and eye irritation. Six of the injured were treated at a hospital and released; the seventh person had symptoms but was not treated. Approximately 100 persons downwind from the release and in the path of the subsequent vapor cloud were evacuated for 2 hours. A shelter-in-place order was issued for other sites near the 1-square-mile evacuation area.

CDC; MMWR 56 (22); 553-6 (June 8, 2007)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

The following case reports illustrate the danger involved in improper disposal of hazardous substances. New York. In June 2004, a sanitation truck compacted an improperly disposed of container of hydrochloric acid, releasing approximately 10 gallons of the hazardous substance into a commercial/residential area. Two male sanitation workers sustained chemical burns and were decontaminated on the scene, treated at a hospital, and released. A hazardous materials (HazMat) team, law enforcement officials, fire department officials, and emergency medical services personnel responded to the event. ... Washington. In June 2002, hydrochloric acid used in an illicit [methamphetamine](#) laboratory was disposed of in an apartment building dumpster. Later, a male sanitation worker sustained respiratory irritation when the acid was dumped into the back of his truck. After the exposure occurred, his supervisor took the worker to a physician for observation. Law enforcement officials, fire department officials, emergency medical services personnel, and an environmental agency responded to the event. Wisconsin. In August 2001, a sanitation truck compacted an improperly disposed of container of hydrochloric acid, releasing approximately 1 gallon of the hazardous substance into a residential area. The sanitation truck driver sustained chemical burns after coming into contact with the acid. He was transported to a hospital, treated for his injury, and released. A HazMat response team responded to the event.

CDC; MMWR 54 (36): 897-9 (September 16, 2005)

► [Hazardous Substances Data Bank \(HSDB\)](#)

A storage tank, containing about 750,000 L of 32% hydrochloric acid solution, started to leak its contents when the natural rubber protective lining of the tank deteriorated and the acid dissolved the flange at its base. Approximately 380,000 L of the hydrochloric solution spilled on the ground and flowed towards a nearby river before remedial actions were undertaken. A vapor cloud occurred above the spill and dissipated within 300 m of the spill site. Firefighters initially used [water](#) to wash the acid out of the spill area. This spill action was halted to reduce the amount of acid reaching the river. Response crews arrived at the spill site, wearing protective clothing and filter masks. Fourteen truckloads of oyster shells were applied onto the spill area. The shells served a dual purpose; Temporary containment of the acid by building dams with the shells and neutralization. The neutralized residue was then raked and shoveled into containers for disposal. The remaining hydrochloric acid in the leaking tank was transferred to another tank. The acid, that reached the river, killed more than 20 fish and a few blue crabs. [Water](#) samples revealed no abnormal environmental effects since the river had been highly polluted for quite some time. Several response personnel developed facial rashes two or three days after the incident. This may have resulted when the winds suddenly shifted direction and increased the exposure of acid fumes to their faces.

World Information Systems, Hazardous Material Intelligence Report (1980) as cited in Environment Canada; Tech Info for Problem Spills: Hydrochloric acid (Draft) p.113 (1981)

► [Hazardous Substances Data Bank \(HSDB\)](#)

Between 1992 and 1997, the New York State Department of Health for the Hazardous Substances Emergency Events Surveillance (HSEES) project has recorded information on 129 actual or threatened hydrochloric acid releases in New York State. The quantities of hydrochloric acid released ranged in volume from 1 to 5,000 gallons, and in weight from 1 to 6,000 pounds. Twenty-five (19%) events involved injuries to 144 persons. In these events, 144 individuals were injured, three of whom died. The three fatalities resulted from trauma following a collision between two trucks, one of them transporting pool chemicals. Although the deaths were not from exposure to hydrochloric acid, they are included in the database because the employees were killed during an accidental chemical release from the collision. Thirty events (23%) led to evacuations totaling more than 4,690 persons. The evacuation numbers are estimated minimums because, in some events, the number of persons evacuated or duration of the evacuation order was unavailable, even when the evacuation was ordered by an official. Fifty-six percent of the releases required a HazMat response (72/129). The total of locations (100) exceeds the number of events (94) because six events are described by two locations, for example, piping and storage above ground. Thirty-eight fixed facility events (40%) occurred in piping which included leaky valves within pipes. Problems during piping, storage above ground, and material handling accounted for about two thirds (68%) of the fixed facility events. Fifty-two percent (75/144) of the injured persons were employees of the companies where the release occurred. Injured employees included both persons working at the location of the event and personnel employed nearby and injured during the release. Thirty-five percent of the injured persons (51/144) were members of the general public, four percent of the injured persons (6/144) were responders (emergency medical personnel, firefighters, police, etc.), and eight percent (12/144) were unknown. A few people (11%) were treated at the scene, but the majority of injured persons (80%) were transported to the hospital, treated and released. The 144 injured persons sustained 216 injuries. The injury total exceeds the number of injured persons because some people sustained more than one injury, for example, respiratory irritation and chemical burns. Thirteen persons sustained three injuries each, the maximum reported. The most prevalent injury, respiratory irritation, was reported by 105 of the injured persons (73%). ...The following are examples of releases that are included in the data: 1. During the delivery of 4,900 gallons of hydrochloric acid to a tank in a chemical plant, the tank ruptured. The tank rupture caused a nearby pipe to break and released a second chemical, [sodium hypochlorite](#). Forty-three persons were treated at nearby hospitals and a two block area was evacuated for four hours. 2. During trash collection, a sanitation worker unknowingly picked up a one gallon container of acid and later crushed it in the hopper. While the acid was fuming, the truck pulled into the Department of Public Works garage. Two sanitation employees working in the garage were injured and required treatment at the hospital for respiratory irritation. 3. A school custodian was absent and called the substitute custodian to direct him to refill the [chlorine](#) container used for swimming pool treatment. The substitute custodian mistakenly added [sodium hypochlorite](#) to a drum of hydrochloric

acid. The off-gassing forced the evacuation of fourteen hundred persons for the rest of the day. Fourteen persons were injured, all suffering from respiratory irritation and some with other injuries. 4. An employee of a restaurant mixed hydrochloric acid and household bleach to clean the floors. Nineteen persons (employees and patrons) were evacuated. Seven persons were transported to area hospitals where five were treated and released, and two were admitted. The other twelve were treated on the scene by Emergency Medical Services.

New York State Department of Health, Hydrochloric Acid Spills in New York State - Hazardous Substances Emergency Events Surveillance (HSEES) 1992-1997; Available from, as of July 9, 2007:
<https://www.health.state.ny.us/environmental/chemicals/hsees/hcl.htm>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.11.3 Special Reports



USEPA/Office of Prevention, Pesticides and Toxic Substances; Reregistration Eligibility Decision Document - Mineral Acids, EPA 738-F-93-025 (December 1993). The RED summarizes the risk assessment conclusions and outlines any risk reduction measures necessary for the pesticide to continue to be registered in the U.S.[Available from, as of February 24, 2015: <http://www.epa.gov/pesticides/reregistration/status.htm>]

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

ATSDR; Medical Management Guidelines for Hydrogen Chloride (HCl) CAS 7647-01-0; UN 1050 (anhydrous), UN 1789 (solution). UN 2186 (refrigerated liquefied gas).[Available from, as of July 31, 2007: <http://www.atsdr.cdc.gov/MHMI/mmg173.html>]

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Environment Canada; Tech Info for Problem Spills: Hydrogen Chloride and Hydrochloric Acid (Draft) (1981)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

WHO; Environmental Health Criteria No. 21: [Chlorine](#) and Hydrogen chloride (1982)[Available from, as of April 4, 2003: <http://www.inchem.org/documents/ehc/ehc/ehc21.htm>]

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Special Reports (Complete) data for HYDROGEN CHLORIDE (6 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)