ORIENT PAPER MILLS - CAUSTIC SODA UNIT, AMLAI, ANUPPUR (M.P.)

PRODUCT STEWARDSHIP SUMMARY

HYDROCHLORIC ACID

Name	:	Hydrochloric acid
Synonyms	:	Hydrogen chloride, Muriatic acid
Chemical Formula	:	HCl
Molecular Weight	:	36.46

Product Overview

Hydrochloric acid is an important and widely used chemical. The largest end uses for hydrochloric acid are steel pickling, oil well acidizing, food manufacturing, producing calcium chloride, and ore processing. Hydrochloric acid is a corrosive liquid, and it must be stored and handled with this hazard in mind.

Production

In hydrochloric acid section the hydrogen gas is burnt with chlorine to get Hydrogen chloride gas which is absorbed in a week acid in a falling film absorber to get 33 % Hydrochloric acid solutions. The unabsorbed gases from the absorber go to recovery column where any leftover Hydrochloric acid vapour gets removed with feed D.M.water to from weak acid which then goes to the absorber.

Uses

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Steel pickling

Hydrochloric acid is used in pickling operations for carbon, alloy and stainless steels. Steel pickling is the process by which iron oxides and scale are removed from the surface of steel by converting the oxides to soluble compounds. Pickling is required for steel products that undergo further processing such as wire production, coating of sheet and strip, and tin mill products. Hydrochloric acid is used primarily for continuous pickling operations in which hot-rolled strip steel is passed through a countercurrent flow of acid solution. In addition to steel pickling, hydrochloric acid is used in aluminum etching, metal prefixing for galvanizing and soldering, and metal cleaning.

Oil well acidizing

Hydrochloric acid is used both to remove rust, scale and undesirable carbonate deposits in oil wells to encourage the flow of crude oil or gas to the well. This use is called "stimulation." Acidizing is generally done in carbonate or limestone formations by stimulation. An acid solution is injected into the formation, which dissolves a portion of the rock and creates a large pore structure in the formation, increasing its effective permeability and the flow of oil.

Food

The food industry uses hydrochloric acid in the processing of a variety of products. A major use of hydrochloric acid by the food industry is for the production of corn syrups such as high-fructose corn syrup (HFCS).

Much of the hydrochloric acid consumed in the HFCS industry is used to regenerate the ion exchange resins that are employed to remove impurities. Hydrochloric acid can also be used to acid-modify cornstarch and to adjust the pH of intermediates, final product and wastewater. The largest use of HFCS is in the production of soft drinks, which accounts for 70-75% of demand.

Other Food Uses

Hydrochloric acid is also used in other food processing applications, including the production of hydrolyzed vegetable protein and soy sauce. It is used in acidulating crushed bones for the manufacture of gelatin and as an acidifier for products such as sauces, vegetable juices and canned goods.
Hydrochloric acid is also consumed in the production of artificial sweeteners and in the production of lysine, choline chloride (both used primarily as animal feed additives) and citric acid.

Production of Calcium Chloride

Neutralizing hydrochloric acid with limestone ($CaCO_3$) produces calcium chloride. The largest use for calcium chloride is highway deicing with production dependent on weather conditions. Other uses include dust control, industrial processing, oil recovery, concrete treatment and tire ballasting. Calcium chloride is also used in oil recovery products such as drilling muds and work over/completion fluids.

Ore Processing

Hydrochloric acid is consumed in many mining operations for ore treatment, extraction, separation, purification and water treatment. Significant quantities are used in the recovery of molybdenum and gold. Hydrochloric acid is used to convert high -grade scheelite concentrate ($CaWO_4$) and crude sodium tungstate to tungstic acid, which in turn, can be used to produce tungsten metal and chemicals. Hydrochloric acid is also used in uranium and zirconium processing, solution mining of borate ores, as a pH regulator in the froth flotation of potash ores, and in rare earth extraction from bastnasite.

Other

Aqueous hydrochloric acid is used in a variety of miscellaneous applications, including the recovery of semiprecious metals from used catalysts, use as a catalyst in synthesis, use in catalyst regeneration, pH control, regeneration of ion exchange resins used in wastewater treatment,DM Water Plant and electric utilities, neutralization of alkaline products or waste materials, and in brine acidification for use in the production of chlorine and caustic soda.

Hydrochloric acid is also used in many other production processes for organic chemicals. It can be used in the production of p-phenylenediamine, polycarbonate resins, bisphenol A, polyvinyl chloride resins, and ethanol (from ethylene).
The pharmaceutical industry consumes hydrochloric acid as a catalyst in synthesis, for pH control, for deionization of water and as a reduction agent (*e.g.,* in the production of ascorbic acid and para-aminobenzoic acid).

Numerous other uses of hydrochloric acid include the manufacture of dyes and pigments; the removal of sludge and scale from industrial equipment; the deliming, tanning and dyeing of hides by the leather industry; manufacture of permanent wave lotion; the carbonizing of wool; use as a bleaching and dyeing assistant in the textile industry; and the purification of sand and clay.

Health Effects

Hydrochloric acid solutions are acidic solutions, meaning they have low pH. For example, the pH of a 0.2% solution is 2. This property means hydrochloric acid is a severe eye, skin, and respiratory tract irritant, and it can burn any tissue with which it comes in contact:

- Eye splashes are especially serious hazards. Contact with the eyes can cause severe irritation, pain, and corneal burns possibly leading to blindness.
- Direct contact with the skin may cause severe burns if the material is not quickly rinsed away with large amounts of water.
- Inhaling mists of hydrochloric acid may result in irritation of the nose and throat with symptoms such as burning, coughing, choking and pain. Inhaling concentrated mist may result in pulmonary edema and shock. Prolonged exposure to mists may result in erosion or discoloration of the teeth.
- Ingesting hydrochloric acid may cause pain and burns of the esophagus and gastrointestinal tract. Ingestion can lead to corrosion of the mucous membranes of the upper part of the digestive tract. Death may result from shock, perforation of the esophagus, aspiration from the esophagus into the trachea (asphyxia), or infection from the corroded tissues.Hydrochloric acid is not classified as a carcinogen by the National Toxicology Program (NTP), the International Agency for Research on Cancer (IARC), or the Occupational Safety and Health Administration (OSHA).

Environmental Effects

Hydrochloric acid is moderately toxic to aquatic organisms. It dissociates in water and can lower the pH of systems that are not well buffered. Since it contains no degradable functional groups, it exerts no biological oxygen demand.

Exposure Potential

Hydrochloric acid is corrosive to the skin and eyes. The most likely ways exposures could occur are:

- **Worker exposure** – Exposure could occur in the manufacturing facility or in industrial facilities that use hydrochloric acid. When exposures occur, they are typically skin or eye exposures. Good industrial hygiene practices and the use of personal protective equipment minimize the risk of exposure.
- **Consumer exposure** – OPM-CSU does not sell Hydrochloric acid in retail stores.

- **Releases** – If a spill occurs, emergency personnel should wear protective equipment to minimize exposures.

Recommended Risk Management Measures

Hydrochloric acid is non-flammable, non-explosive, and non-toxic. It is, however, an acidic material and poses hazards to the skin and eyes. Hydrochloric acid can react with certain materials of construction. Prior to using hydrochloric acid, carefully read and comprehend the Material Safety Data Sheet. The following are some risk management measures that are effective against these hazards:

- Provide eyewash fountains and safety showers in areas where hydrochloric acid is used or handled. Any hydrochloric acid burn may be serious. Flush areas that have come in contact with hydrochloric acid with large amounts of water, and then seek medical attention. DO NOT use any kind of neutralizing solution, particularly in the eyes, without direction by a physician.

- To prevent eye contact, protective eye wear (such as splash goggles, a full face shield, or safety glasses with side shields) must be worn.

- Work areas where hydrochloric acid is used should be well ventilated to maintain concentrations below exposure limits. If exposures exceed accepted limits or if respiratory discomfort is experienced, use a NIOSH approved air purifying respirator with acid gas cartridges.

- Wear chemical resistant clothing to prevent contact with the body.

- While handling hydrochloric acid, wear rubber gloves to protect the hands and rubber boots to protect the feet. Gloves should be long enough to come well above the wrist, and sleeves should be positioned over the glove wrists. Wear the bottoms of trouser legs outside the boots. DO NOT tuck the trouser legs into the boots.

- Residues that dry on equipment can cause irritation. Keep equipment clean by washing off any accumulation.

- Proper labeling, handling and storage of hydrochloric acid will reduce the likelihood of accidental ingestion.

- Equipment used for hydrochloric acid storage or processing should be constructed of the proper materials.

- When making solutions, always add the hydrochloric acid slowly to the surface of the water with constant agitation. Never add the water to the hydrochloric acid. Dangerous boiling or splattering can occur if hydrochloric acid is added too rapidly or allowed to concentrate in one area. Care must be taken to avoid these situations.

- Personnel involved with hydrochloric acid handling operations should be properly trained. For detailed recommendations regarding personnel involved in unloading hydrochloric acid.

Packaging and Transportation

HCL is stored in FRP tanks and transported through MS rubber lined road tankers

Physical and Chemical Properties

Corrosivity

Hydrochloric acid is very corrosive to the skin and mucous membranes and can cause severe burns to any part of the body. The corneas of the eyes are especially sensitive to hydrochloric acid and exposure to it or its vapors immediately causes severe irritation. If the eyes are not quickly and thoroughly irrigated with water, partial or total visual impairment or blindness can occur.

Reactivity

Hydrochloric acid is extremely corrosive to metals, including the following: carbon steel, stainless steel, nickel, Monel®[1] , bronze, brass, copper, Inconel®[1], and aluminum. These are commonly used industrial materials. Great care should be taken to avoid contact of these materials with hydrochloric acid.
Hydrochloric acid is shipped in rubber- lined tank cars or tank trucks. It is most commonly stored either in rubber-lined steel storage tanks or in fiberglass-reinforced plastic storage tanks. Choosing the correct material of construction for piping, hoses, pumps, valves and other equipment is also very important to extend the life of the equipment, prevent corrosion, and prevent leaks.

In addition, considerable heat is generated when hydrochloric acid is mixed with water, which can result in boiling or splattering. When diluting, always add hydrochloric acid to water; never add water to hydrochloric acid.

Regulatory Information

The HCL Safety Data Sheet contains regulatory information, including Global Chemical Inventory Status information.

The following is a summary of regulations and guidelines that may pertain to hydrochloric acid (additional regulations and guidelines may apply):

- Hydrochloric acid is listed as a Hazardous Air Pollutant in Section 112(b) of the Clean Air Act.
- Hydrochloric acid is designated as a hazardous substance under Section 311(b) (2) of the Clean Water Act. See 40 CFR 116.4.
- A release of hydrochloric acid in an amount greater than the Reportable Quantity (RQ) is subject to reporting under Comprehensive Environmental Response, Compensation and Liability Act, Section 103. The RQ for hydrochloric acid is 5000 pounds. See 40 CFR 302.4.

- Possible Resource Conservation and Recovery Act (hazardous waste) Codes: D002
- FDA - Hydrochloric acid used as a buffer and neutralizing agent in food for human consumption is generally recognized as safe when used in accordance with good manufacturing practice. See 21 CFR 182.1057.
- The Occupational Safety and Health Administration has established a Permissible Exposure Limit for hydrochloric acid. The limit is 5 parts per million (ppm) as a ceiling limit.
- The American Conference of Governmental Industrial Hygienists has established a Threshold Limit Value for hydrochloric acid. The guideline is 2 ppm as a ceiling limit.
- The National Institute for Occupational Safety and Health has established an Immediately Dangerous to Life and Health concentration for hydrochloric acid. The concentration is 50 ppm.

Product Stewardship

OPM-CSU is committed to managing HCl so that it can be safely used by its employees and customers. OPM-CSU's relationships with its customers encourage communication about safety and environmental stewardship

Additional Information

For more information regarding OPM-CSU's HCL , contact our customer service department by calling 18-00-111735 Or, in Orient Paper Mills - Caustic Soda Unit, Distt. Anuppur, Madhya Pradesh – 484 117 India.

Notice

Prior to its use, the user is responsible for determining the suitability of the product or products covered by this Product Stewardship Summary and for complying with state, local laws and regulations in connection with its use. Neither OPM-CSU nor any of its affiliates shall be responsible for any damages of any kind whatsoever resulting from the use of or reliance on this Product Stewardship Summary or product or products to which it refers.

This Product Stewardship Summary is intended only to provide a general summary of the potential hazards associated with the product or products described herein. It is not intended to provide detailed information about potential health effects and safe use and handling information and, although OPM-CSU believes this information is correct, OPM-CSU makes no warranties as to its completeness or accuracy.

Appropriate literature has been assembled which provides information concerning the health and safety precautions that must be observed when handling the OPM-CSU product(s) mentioned in this document. Before working with any of these products, users must read and become familiar with the available information on product hazards, proper use, and handling. Information is available in several forms, such as Material safety data sheets (MSDS) and product labels. A copy of OPM-CSU's MSDS for HCl can be obtained by the company.

This information is subject to change without notice.
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