



MALAY-SINO CHEMICAL INDUSTRIES SDN BHD (16055-T)

SAFETY DATA SHEET

HYDROCHLORIC ACID 10% - 34% (HCl)

SECTION 1: IDENTIFICATION OF THE HAZARDOUS CHEMICAL AND OF THE SUPPLIER

CAS NO

7647 – 01 - 0

PRODUCT NAME

HYDROCHLORIC ACID (10%~34%)

PROPER SHIPPING NAME

HYDROCHLORIC ACID

PRODUCT USE

Production of chlorides, boiler scale removal, laboratory reagent, general purpose food additive and used for pickling and cleaning metals.

MANUFACTURER

MALAY-SINO CHEMICAL INDUSTRIES SDN. BHD.

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PRINCIPAL SUPPLIER

TAIKO MARKETING SDN. BHD.

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SECTION 2: HAZARD IDENTIFICATION

ICOP CLASSIFICATION

Skin Corr. 1B	Skin corrosion or irritation category 1B.
Eye Dam. 1	Serious eye damage or eye irritation category 1.
STOT SE 3	Specific target organ toxicity – single exposure category 3.



EMERGENCY OVERVIEW

Signal Word : DANGER

**DETERMINED BY USING ICOP CRITERIA
HAZARD STATEMENT**



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H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H335	May cause respiratory irritation (respiratory tract irritation).

PRECAUTIONARY STATEMENTS

Prevention

Code	Phrase
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash hand thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response

Code	Phrase
P301+P330+P331	IF SWALLOWED: Rinse mouth. DO NOT induce vomiting.
P303+P361+P353	IF ON SKIN (or hair): Remove / take off immediately all contaminated clothing. Rinse skin with water/shower.
P304+P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor / physician.
P321	Specific treatment is urgent.
P363	Wash contaminated clothing before reuse.

Storage

Code	Phrase
P403+P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.

Disposal

Code	Phrase
P501	Dispose of contents/ container to according appropriate schedule waste.

SECTION 3: COMPOSITION AND INFORMATION OF THE INGREDIENTS OF THE HAZARDOUS CHEMICAL



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NAME	CAS RN	%
Hydrochloric Acid	7647-01-0	10 - 34
Water	7732-18-5	Remaining

SECTION 4: FIRST-AID MEASURES

SWALLOWED

- For advice, contact a Poisons Information Centre or a doctor at once.
- Urgent hospital treatment is likely to be needed.
- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Transport to hospital or doctor without delay.

EYE

- If this product comes in contact with the eyes:
- Immediately hold eyelids apart and flush the eye continuously with running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
- Transport to hospital or doctor without delay.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

- If skin or hair contact occurs:
- Immediately flush body and clothes with large amounts of water, using safety shower if available.
- Quickly remove all contaminated clothing, including footwear.
- Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre.



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- Transport to hospital or doctor without delay.

INHALED

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital or doctor without delay.
- Inhalation of vapours or aerosols (mists, fumes) may cause lung oedema.
- Corrosive substances may cause lung damage (e.g. lung oedema, fluid in the lungs).
- As this reaction may be delayed up to 24 hours after exposure, affected individuals need complete rest (preferably in semi-recumbent posture) and must be kept under medical observation even if no symptoms are (yet) manifested.
- Before any such manifestation, the administration of a spray containing a dexamethasone derivative or beclomethasone derivative may be considered.
This must definitely be left to a doctor or person authorized by him/her. (ICSC13719)

NOTES TO PHYSICIAN

- Treat symptomatically.
For acute or short-term repeated exposures to strong acids:
- Airway problems may arise from laryngeal edema and inhalation exposure. Treat with 100% oxygen initially.
- Respiratory distress may require cricothyroidotomy if endotracheal intubation is contraindicated by excessive swelling.
- Intravenous lines should be established immediately in all cases where there is evidence of circulatory compromise.
- Strong acids produce a coagulation necrosis characterised by formation of a coagulum (eschar) as a result of the desiccating action of the acid on proteins in specific tissues.

INGESTION:

- Immediate dilution (milk or water) within 30 minutes post ingestion is recommended.
- DO NOT attempt to neutralize the acid since exothermic reaction may extend the corrosive injury.
- Be careful to avoid further vomit since re-exposure of the mucosa to the acid is harmful. Limit fluids to one or two glasses in an adult.
- Charcoal has no place in acid management.



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- Some authors suggest the use of lavage within 1 hour of ingestion.

SKIN:

- Skin lesions require copious saline irrigation. Treat chemical burns as thermal burns with non-adherent gauze and wrapping.
- Deep second-degree burns may benefit from topical silver sulfadiazine.

EYE:

- Eye injuries require retraction of the eyelids to ensure thorough irrigation of the conjunctival cul-de-sacs. Irrigation should last at least 20-30 minutes. **DO NOT** use neutralising agents or any other additives. Several litres of saline are required.
- Cycloplegic drops, (1% cyclopentolate for short-term use or 5% homatropine for longer term use) antibiotic drops, vasoconstrictive agents or artificial tears may be indicated dependent on the severity of the injury.
- Steroid eye drops should only be administered with the approval of a consulting ophthalmologist). [Ellenhorn and Barceloux: Medical Toxicology].
If exposure has been severe and/or symptoms marked, observation in hospital for 48 hours should be considered due to possibility of delayed pulmonary oedema.

SECTION 5: FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA

- Water spray or fog.
- Foam.
- Dry chemical powder.
- Carbon dioxide.

FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Use fire fighting procedures suitable for surrounding area.
- Do not approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.



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- When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 800 metres in all directions.

FIRE/ EXPLOSION HAZARD

- Non combustible.
- Not considered to be a significant fire risk.
- Acids may react with metals to produce hydrogen, a highly flammable and explosive gas.
- Heating may cause expansion or decomposition leading to violent rupture of containers.
- May emit corrosive, poisonous fumes. May emit acrid smoke.
- Decomposition may produce toxic fumes of: hydrogen chloride.
- Contains low boiling substance: Closed containers may rupture due to pressure buildup under fire conditions.

FIRE INCOMPATIBILITY

- None known.

SECTION 6: ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

- Drains for storage or use areas should have retention basins for pH adjustments and dilution of spills before discharge or disposal of material.
- Check regularly for spills and leaks.
- Clean up all spills immediately.
- Avoid breathing vapours and contact with skin and eyes.
- Control personal contact with the substance, by using protective equipment.
- Contain and absorb spill with sand, earth, inert material or vermiculite.
- Wipe up.
- Place in a suitable, labelled container for waste disposal.

MAJOR SPILLS

- Chemical Class: acidic compounds, inorganic
For release onto land: recommended sorbents listed in order of priority.

SORBENT TYPE	RANK	APPLICATION	COLLECTION	LIMITATIONS
LAND SPILL – SMALL foamed glass -	1	throw	pitchfork	R, P, DGC, RT



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pillows				
expanded mineral - particulate	2	shovel	shovel	R, I, W, P, DGC
foamed glass - particulate	2	shovel	shovel	R, W, P, DGC

LAND SPILL – MEDIUM

expanded mineral - particulate	1	blower	Skip loader	R, I, W, P, DGC
foamed glass - particulate	2	blower	Skip loader	R, W, P, DGC
foamed glass - particulate	3	throw	Skip loader	R, W, P, DGC

Legend

DGC: Not effective where ground cover is dense

R: Not reusable

I: Not incinerable

P: Effectiveness reduced when rainy

RT: Not effective where terrain is rugged

SS: Not for use within environmentally sensitive sites

W: Effectiveness reduced when windy

Reference: Sorbents for Liquid Hazardous Substance Cleanup and Control;

R.W Melvold et al: Pollution Technology Review No. 150: Noyes Data Corporation 1988.

- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Stop leak if safe to do so.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labelled containers for recycling.
- Neutralise/decontaminate residue (see Section 13 for specific agent).
- Collect solid residues and seal in labelled drums for disposal.
- Wash area and prevent runoff into drains.
- After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
- If contamination of drains or waterways occurs, advise emergency services.



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PROTECTIVE ACTIONS FOR SPILL

1. PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the down wind protective action distance.
2. PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/ or incurring serious or irreversible health effects.
3. INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localized wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.
4. SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered “small spills”.
5. LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a “one-tonne” compressed gas cylinder.
6. Guide 154 is taken from the US DOT emergency response guide book.
7. IERG information is derived from CANUTEC – Transport Canada.

EMERGENCY RESPONSE PLANNING GUIDELINES (ERPG)

The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing life-threatening health effects is: hydrochloric acid 150 ppm irreversible or other serious effects or symptoms which could impair an individual’s ability to take protective action is: hydrochloric acid 20 ppm other than mild, transient adverse effects without perceiving a clearly defined odour is: hydrochloric acid 3 ppm*

American Industrial Hygiene Association (AIHA)

Ingredients considered according to the following cutoffs

Very Toxic (T+)	>= 0.1 %	Toxic (T)	>= 3.0 %
R50	>= 0.25 %	Corrosive	>= 5.0 %



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R51	$\geq 2.5 \%$
Else	$\geq 10 \%$

where percentage is percentage of ingredient found in the mixture.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7: HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Contains low boiling substance:
Storage in sealed containers may result in pressure buildup causing violent rupture of containers not rated appropriately.
- Check for bulging containers.
- Vent periodically
- Always release caps or seals slowly to ensure slow dissipation of vapours.
- DO NOT allow clothing wet with material to stay in contact with skin.
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- **WARNING:** To avoid violent reaction, ALWAYS add material to water and NEVER water to material.
- Avoid smoking, naked lights or ignition sources.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately. Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer's storage and handling recommendations contained within this MSDS.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

SUITABLE CONTAINER

- DO NOT use aluminium or galvanised containers.
- Check regularly for spills and leaks.



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- Lined metal can, lined metal pail/ can.
- Plastic pail.
- Polyliner drum.
- Packing as recommended by manufacturer.
- Check all containers are clearly labelled and free from leaks. For low viscosity materials
- Drums and jerricans must be of the non-removable head type.
- Where a can is to be used as an inner package, the can must have a screwed enclosure.
- For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids (between 15 C deg. and 40 deg C.):
- Removable head packaging;
- Cans with friction closures and
- Low pressure tubes and cartridges may be used.

Where combination packages are used, and the inner packages are of glass, porcelain or stoneware, there must be sufficient inert cushioning material in contact with inner and outer packages unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.

STORAGE INCOMPATIBILITY

- Inorganic acids are generally soluble in water with the release of hydrogen ions. The resulting solutions have pH's of less than 7.0.
- Inorganic acids neutralise chemical bases (for example: amines and inorganic hydroxides) to form salts - neutralisation can generate dangerously large amounts of heat in small spaces.
- The dissolution of inorganic acids in water or the dilution of their concentrated solutions with additional water may generate significant heat.
- The addition of water to inorganic acids often generates sufficient heat in the small region of mixing to cause some of the water to boil explosively. The resulting "bumping" can spatter the acid.
- Inorganic acids react with active metals, including such structural metals as aluminum and iron, to release hydrogen, a flammable gas.
- Inorganic acids can initiate the polymerisation of certain classes of organic compounds.
- Inorganic acids react with cyanide compounds to release gaseous hydrogen cyanide.
- Inorganic acids generate flammable and/or toxic gases in contact with dithiocarbamates, isocyanates, mercaptans, nitrides, nitriles, sulfides, and strong reducing agents. Additional gas-generating reactions occur with sulfites, nitrites, thiosulfates (to give H₂S and SO₃), dithionites (SO₂), and even carbonates.



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- Acids often catalyse (increase the rate of) chemical reactions. Hydrogen chloride:
- Reacts strongly with strong oxidisers (releasing chlorine gas), acetic anhydride, caesium cyanotridecahydrodecaborate(2-), ethylidene difluoride, hexalithium disilicide, metal acetylides, sodium, silicon dioxide, tetraselenium tetranitride, and many organic materials
- Is incompatible with alkaline materials, acetic anhydride, acetylides, aliphatic amines, alkanolamines, alkylene oxides, aluminium, aluminium-titanium alloys, aromatic amines, amines, amides, 2-aminoethanol, ammonia, ammonium hydroxide, borides, calcium phosphide, carbides, carbonates, cyanides, chlorosulfonic acid, ethylenediamine, ethyleneimine, epichlorohydrin, formaldehyde, isocyanates, metals, metal oxides, metal hydroxides, metal acetylides, metal carbides, oleum, organic anhydrides, potassium permanganate, perchloric acid, phosphides, 3-propiolactone, silicides, sulfides, sulfites, sulfuric acid, uranium phosphide, vinyl acetate, vinylidene fluoride
- Attacks most metals forming flammable hydrogen gas, and some plastics, rubbers and coatings
- Reacts with zinc, brass, galvanised iron, aluminium, copper and copper alloys.
- Reacts vigorously with alkalis.
- Reacts with mild steel, galvanised steel / zinc producing hydrogen gas which may form an explosive mixture with air.

STORAGE REQUIREMENTS

- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storage and handling recommendations contained within this SDS.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



X



X



+



X



+

+: May be stored together

O: May be stored together with specific precautions

X: Must not be stored together



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SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	Ceiling ppm
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Use and Standard Of Exposure Of Chemical
Hazardous To Health (OSHA Act 1994)

Permissible Exposure Limits of Toxic Substances	HYDROCHLORIC ACID 33% (Hydrogen chloride)	7.5
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The following materials had no OELs on our records

- Water: CAS: 7732 – 18 - 5

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m ³)	Revised IDLH Value (ppm)
Hydrochloric Acid	52	50

MATERIAL DATA

HYDROCHLORIC ACID 33%:

- Not available.

HYDROCHLORIC ACID:

- For hydrogen chloride:

Odour Threshold Value: 0.262 ppm (detection), 10.06 ppm (recognition)

NOTE: Detector tubes for hydrochloric acid, measuring in excess of 1 ppm, are available commercially. Hydrogen chloride is a strong irritant to the eyes, mucous membranes and skin.

Chronic exposure produces a corrosive action on the teeth. Reports of respiratory irritation following short-term exposure at 5 ppm have lead to the recommended TLV-C. There is no indication that skin contact with hydrogen chloride elicits systemic poisoning and a skin designation has not been applied.

Exposure of humans to hydrogen chloride at 50 to 100 ppm for 1 hour is reported to be barely tolerable; 35 ppm caused irritation of the throat on short exposure and 10 ppm was the maximal concentration for prolonged exposure. It has been stated that hydrogen chloride at concentrations of 5 ppm is immediately irritating.



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Odour Safety Factor(OSF)

OSF = 1.3 (HYDROGEN CHLORIDE).

WATER:

- No exposure limits set by NOHSC or ACGIH.

PERSONAL PROTECTION



EYE

- Safety glasses with unperforated side shields may be used where continuous eye protection is desirable, as in laboratories; spectacles are not sufficient where complete eye protection is needed such as when handling bulk-quantities, where there is a danger of splashing, or if the material may be under pressure.
- Chemical goggles. Whenever there is a danger of the material coming in contact with the eyes; goggles must be properly fitted.
- Full face shield (20 cm, 8 in minimum) may be required for supplementary but never for primary protection of eyes; these afford face protection.
- Alternatively a gas mask may replace splash goggles and face shields.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent].

HANDS / FEET

- Elbow length PVC gloves.

Revision No.: 03

Revision Date: 31st December 2020

Preparation Date: 1st March 2015



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- When handling corrosive liquids, wear trousers or overalls outside of boots, to avoid spills entering boots. The selection of the suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.
- The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.
- Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:
 - frequency and duration of contact,
 - chemical resistance of glove material,
 - glove thickness and
 - dexterity
- Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent).
- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.
- Contaminated gloves should be replaced.
- Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.

OTHER

- Overalls
- PVC Apron
- PVC protective suit may be required if exposure severe.
- Eyewash unit.
- Ensure there is ready access to a safety shower.

RESPIRATOR

- Type B-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)
- Selection of the Class and Type of respirator will depend upon the level of breathing zone



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contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Required minimum Respirator protection factor	Maximum gas / vapour concentration present in air p.p.m. (by volume)	Half-face Respirator	Full-Face
up to 10	1000	b – AUS/ Class1 p	-
up to 50	1000	-	b – AUS/ Class1 p
up to 50	5000	Airline*	-
up to 100	5000	-	b – 2 p
up to 100	10000	-	b – 3 p
100+			Airline**

* - Continuous Flow ** - Continuous-flow or positive pressure demand

A (All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide (HCN), B3 = Acid gas or hydrogen cyanide (HCN), E = Sulfur dioxide (SO₂), G = Agricultural chemicals, K = Ammonia (NH₃), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds (below 65 degC).

ENGINEERING CONTROLS

- Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.
- The basic types of engineering controls are:
 - Process controls which involve changing the way a job activity or process is done to reduce the risk.
 - Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use.
 - Employers may need to use multiple types of controls to prevent employee overexposure.



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- Local exhaust ventilation usually required. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection. Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection.
- An approved self-contained breathing apparatus (SCBA) may be required in some situations. Provide adequate ventilation in warehouse or closed storage area.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

Colourless to yellow, clear acidic liquid with characteristic odour; mixes with water.

PHYSICAL PROPERTIES

Liquid.

Mixes with water.

Corrosive.

Acid.

Toxic or noxious vapours / gas.

State	Liquid	Molecular Weight	Not applicable
Melting Range (°C)	- 46.2	Viscosity	Not available
Boiling Range (°C)	108.6	Solubility in water (g/L)	Miscible
Flash Point (°C)	Non Applicable	pH (1% Solution)	Not available
Decomposition Temp (°C)	Not Available	pH (as supplied)	<1
Autoignition Temp (°C)	Not Available	Vapour Pressure (kPa)	17 mmHg @ 20 deg C
Upper Explosive Limit (%)	Not Applicable	Specific Gravity (water=1)	1.16
Lower Explosive Limit (%)	Not Applicable	Relative Vapour Density (air=1)	Not available
Volatile Component (% vol)	50 approx	Evaporation Rate	Not available

SECTION 10: STABILITY AND REACTIVITY

CONDITIONS CONTRIBUTING TO INSTABILITY

- Contact with alkaline material liberates heat.



For incompatible materials - refer to Section 7 - Handling and Storage.

SECTION 11 – TOXICOLOGICAL INFORMATION

Health hazard summary table:

Acute toxicity	Not applicable
Skin corrosion/irritation	Skin Corr. 1B
Serious eye damage/irritation	Eye Dam. 1
Respiratory or skin sensitization	Not applicable
Germ cell mutagenicity	Not applicable
Carcinogenicity	Not applicable
Reproductive toxicity	Not applicable
STOT- single exposure	STOT SE 3
STOT- repeated exposure	Not applicable
Aspiration hazard	Not applicable

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

- Ingestion of acidic corrosives may produce circumoral burns with a distinct discolouration of the mucous membranes of the mouth, throat and oesophagus. Immediate pain and difficulties in swallowing and speaking may also be evident. Oedema of the epiglottis may produce respiratory distress and possibly, asphyxia. Nausea, vomiting, diarrhoea and a pronounced thirst may occur. More severe exposures may produce a vomitus containing fresh or dark blood and large shreds of mucosa. Shock, with marked hypotension, weak and rapid pulse, shallow respiration and clammy skin may be symptomatic of the exposure. Circulatory collapse may, if left untreated, result in renal failure. Severe cases may show gastric and oesophageal perforation with peritonitis, fever and abdominal rigidity. Stricture of the oesophageal, gastric and pyloric sphincter may occur as within several weeks or may be delayed for years. Death may be rapid and often results from asphyxia, circulatory collapse or aspiration of even minute amounts. Delayed deaths may be due to peritonitis, severe nephritis or pneumonia. Coma and convulsions may be terminal.
- Not normally a hazard due to physical form of product.
- Considered an unlikely route of entry in commercial / industrial environments.



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EYE

- When applied to the eye(s) of animals, the material produces severe ocular lesions which are present twenty-four hours or more after instillation.
- Direct eye contact with acid corrosives may produce pain, lachrymation, photophobia and burns. Mild burns of the epithelia generally recover rapidly and completely. Severe burns produce long-lasting and possible irreversible damage. The appearance of the burn may not be apparent for several weeks after the initial contact. The cornea may ultimately become deeply vascularised and opaque resulting in blindness.

SKIN

- Skin contact with acidic corrosives may result in pain and burns; these may be deep with distinct edges and may heal slowly with the formation of scar tissue.
- Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.
- Open cuts, abraded or irritated skin should not be exposed to this material.
- Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED

- Evidence shows, or practical experience predicts, that the material produces irritation of the respiratory system, in a substantial number of individuals, following inhalation. In contrast to most organs, the lung is able to respond to a chemical insult by first removing or neutralising the irritant and then repairing the damage. The repair process, which initially evolved to protect mammalian lungs from foreign matter and antigens, may however, produce further lung damage resulting in the impairment of gas exchange, the primary function of the lungs. Respiratory tract irritation often results in an inflammatory response involving the recruitment and activation of many cell types, mainly derived from the vascular system.
- Acidic corrosives produce respiratory tract irritation with coughing, choking and mucous membrane damage. Symptoms of exposure may include dizziness, headache, nausea and weakness. In more severe exposures, pulmonary oedema may be evident either immediately or after a latent period of 5-72 hours. Symptoms of pulmonary oedema include a tightness in the chest, dyspnoea, frothy sputum and cyanosis. Examination may reveal hypotension, a weak and rapid pulse and moist rates. Death, due to anoxia, may occur several hours after onset of the pulmonary oedema.
- Hydrogen chloride (HCl) vapour or fumes present a hazard from a single acute exposure. Exposures of 1300 to 2000 ppm have been lethal to humans in a few minutes. Inhalation of



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HCl may cause choking, coughing, burning sensation and may cause ulceration of the nose, throat and larynx. Fluid on the lungs followed by generalised lung damage may follow. Breathing of HCl vapour may aggravate asthma and inflammatory or fibrotic pulmonary disease. High concentrations cause necrosis of the tracheal and bronchial epithelium, pulmonary oedema, atelectasis and emphysema and damage to the pulmonary blood vessels and liver.

- Inhalation of aerosols (mists, fumes), generated by the material during the course of normal handling, may produce toxic effects; these may be fatal.

CHRONIC HEALTH EFFECTS

- Repeated or prolonged exposure to acids may result in the erosion of teeth, inflammatory and ulcerative changes in the mouth and necrosis (rarely) of the jaw. Bronchial irritation, with cough, and frequent attacks of bronchial pneumonia may ensue. Gastrointestinal disturbances may also occur. Chronic exposures may result in dermatitis and/or conjunctivitis.
- The impact of inhaled acidic agents on the respiratory tract depends upon a number of interrelated factors.
- These include physicochemical characteristics, e.g., gas versus aerosol; particle size (small particles can penetrate deeper into the lung); water solubility (more soluble agents are more likely to be removed in the nose and mouth). Given the general lack of information on the particle size of aerosols involved in occupational exposures to acids, it is difficult to identify their principal deposition site within the respiratory tract.
- Acid mists containing particles with a diameter of up to a few micrometers will be deposited in both the upper and lower airways. They are irritating to mucous epithelia, they cause dental erosion, and they produce acute effects in the lungs (symptoms and changes in pulmonary function). Asthmatics appear to be at particular risk for pulmonary effects.
- Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.
- Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.
- Chronic minor exposure to hydrogen chloride (HCl) vapour or fume may cause discolouration or erosion of the teeth, bleeding of the nose and gums; and ulceration of the nasal mucous membranes.
- Repeated exposures of animals to concentrations of about 34 ppm HCl produced no immediate toxic effects. Workers exposed to hydrochloric acid suffered from gastritis and a number of cases of chronic bronchitis have also been reported.
- Repeated or prolonged exposure to dilute solutions of HCl may cause dermatitis.



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HYDROCHLORIC ACID 10% - 34% (HCl)

TOXICITY AND IRRITATION

WATER

HYDROCHLORIC ACID:

- No significant acute toxicological data identified in literature search.

HYDROCHLORIC ACID 33% :

- Not available. Refer to individual constituents.
- Unless otherwise specified data extracted from RTECS – Register of Toxic Effects of Chemical Substances.

TOXICITY

Unreported (man) LDLo: 81 mg/kg
Inhalation (human) LCLo: 1300 ppm/30 min
Inhalation (human) LCLo: 3000 ppm/5 min
Inhalation (rat) LC50: 3124 ppm/1h
Oral (rat) LD50:900 mg/kg

IRRITATION

Eye (rabbit): 5mg/30s – Mild

- Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant.
- A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production for acid mists, aerosols, vapours.
- Data from assays for genotoxic activity in vitro suggest that eukaryotic cells are susceptible to genetic damage when the pH falls to about 6.5. Cells from the respiratory tract have not been examined in this respect. Mucous secretion may protect the cells of the airways from direct exposure to inhaled acidic mists, just as mucous plays an important role in protecting the gastric epithelium from its auto-secreted hydrochloric acid. In considering whether pH itself induces genotoxic events in vivo in the respiratory system, comparison should be made with the human stomach, in which gastric juice may be at pH 1-2 under fasting or nocturnal conditions, and with the human urinary bladder, in which the pH of urine can range from <5



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to > 7 and normally averages 6.2. Furthermore, exposures to low pH in vivo differ from exposures in vitro in that, in vivo, only a portion of the cell surface is subjected to the adverse conditions, so that perturbation of intracellular homeostasis may be maintained more readily than in vitro.

- The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.
- The substance is classified by IARC as Group 3.
- NOT classifiable as to its carcinogenicity to humans.
- Evidence of carcinogenicity may be inadequate or limited in animal testing.

CARCINOGEN

Hydrochloric acid	International Agency For Research on Cancer (IARC) – Agents Reviewed by the IARC Monographs	Group	3
Hydrochloric acid	International Agency For Research on Cancer (IARC) – Agents Reviewed by the IARC Monographs	Group	1

SKIN

Hydrochloric acid	GESAMP/ EHS Composite List - GESAMP Hazard Profiles	D1: skin irritation/ corrosion	3C
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SECTION 12: ECOLOGICAL INFORMATION

HYDROCHLORIC ACID:

Hazardous Air Pollutant: Yes
Fish LC50 (96hr.) (mg/l): 0.282
Ecotoxicity:

- The tolerance of water organisms towards pH margin and variation is diverse. Recommended pH values for test species listed in OECD guidelines are between 6.0 and almost 9. Acute testing with fish showed 96h-LC50 at about pH 3.5.
- Although inorganic chloride ions are not normally considered toxic they can exist in effluents at acutely toxic levels (chloride >3000 mg/l). The resulting salinity can exceed the tolerances of most freshwater organisms.



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- Inorganic chlorine eventually finds its way into the aqueous compartment and as such is bioavailable. Incidental exposure to inorganic chloride may occur in occupational settings where chemicals management policies are improperly applied. The toxicity of chloride salts depends on the counter-ion (cation) present; that of chloride itself is unknown. Chloride toxicity has not been observed in humans except in the special case of impaired sodium chloride metabolism, e.g. in congestive heart failure. Healthy individuals can tolerate the intake of large quantities of chloride provided that there is a concomitant intake of fresh water.
- Although excessive intake of drinking-water containing sodium chloride at concentrations above 2.5 g/litre has been reported to produce hypertension, this effect is believed to be related to the sodium ion concentration.
- Chloride concentrations in excess of about 250 mg/litre can give rise to detectable taste in water, but the threshold depends upon the associated cations. Consumers can, however, become accustomed to concentrations in excess of 250 mg/litre. No health-based guideline value is proposed for chloride in drinking-water.
- In humans, 88% of chloride is extracellular and contributes to the osmotic activity of body fluids. The electrolyte balance in the body is maintained by adjusting total dietary intake and by excretion via the kidneys and gastrointestinal tract. Chloride is almost completely absorbed in normal individuals, mostly from the proximal half of the small intestine. Normal fluid loss amounts to about 1.5-2 liters/day, together with about 4 g of chloride per day. Most (90 - 95%) is excreted in the urine, with minor amounts in faeces (4-8%) and sweat (2%).
- Chloride increases the electrical conductivity of water and thus increases its corrosivity. In metal pipes, chloride reacts with metal ions to form soluble salts thus increasing levels of metals in drinking-water. In lead pipes, a protective oxide layer is built up, but chloride enhances galvanic corrosion. It can also increase the rate of pitting corrosion of metal pipes.
- Prevent, by any means available, spillage from entering drains or water courses. DO NOT discharge into sewer or waterways.

Ecotoxicity

Fish LC100 (24 h): trout 10 mg/l

TLm (96 h): mosquito fish 282 ppm (fresh water) LC50: goldfish 178 mg/l

Shrimp LC50 (48 h): 100 - 330 ppm (salt water) Starfish LC50 (48 h): 100 - 330 mg/l

Cockle LC50 (48 h): 330 - 1000 mg/l [Hach]

- Hydrogen chloride in water dissociates almost completely, releasing hydrogen and chloride ions; the hydrogen ions are captured by water to produce hydronium ions.
- Hydrochloric acid infiltrates soil, the rate dependent on moisture content. During soil



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transport, hydrochloric acid dissolves soil components.

- Drinking water standard: chloride: 400 mg/l (UK max.) 250 mg/l (WHO guideline)

Ecotoxicity

Ingredient	Persistence: Water/ Soil	Persistence: Air	Bioaccumulation	Mobility
Hydrochloric Acid	LOW	No Data Available	LOW	HIGH

SECTION 13: DISPOSAL INFORMATION

- Containers may still present a chemical hazard/ danger when empty.
- Return to supplier for reuse/ recycling if possible.
Otherwise:
 - If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.
 - Where possible retain label warnings and MSDS and observe all notices pertaining to the product. Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.
 - A Hierarchy of Controls seems to be common - the user should investigate:
 - Reduction
 - Reuse
 - Recycling
 - Disposal (if all else fails)
 - This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.
 - DO NOT allow wash water from cleaning or process equipment to enter drains.
 - It may be necessary to collect all wash water for treatment before disposal.
 - In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.



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- Where in doubt contact the responsible authority.
- Recycle wherever possible.
- Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
- Treat and neutralise at an approved treatment plant. Treatment should involve: Neutralisation with soda-ash or soda-lime followed by: burial in a land-fill specifically licenced to accept chemical and / or pharmaceutical wastes or Incineration in a licenced apparatus (after admixture with suitable combustible material).
- Decontaminate empty containers with 5% aqueous sodium hydroxide or soda ash, followed by water. Observe all label safeguards until containers are cleaned and destroyed.

SECTION 14: TRANSPORTATION INFORMATION



Labels Required: CORROSIVE

Land Transport UNDG:

Class or division:	8	Subsidiary risk:	None
UN No:	1789	UN packing group:	II
Shipping Name: HYDROCHLORIC ACID			

Air Transport IATA:

ICAO/ IATA Class:	8	ICAO/ IATA Subrisk:	None
UN/ ID Number:	1789	Packing Group:	II
Special provisions:	A3A803		
Shipping Name: HYDROCHLORIC ACID			

Maritime Transport IMDG:

IMDG Class:	8	IMDG Subrisk:	None
UN Number:	1789	Packing Group:	II
EMS Number:	F – A, S – B	Special Provisions:	None
Limited Quantities:	1 L		
Shipping Name: HYDROCHLORIC ACID			

Revision No.: 03

Revision Date: 31st December 2020

Preparation Date: 1st March 2015

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SECTION 15: REGULATORY INFORMATION

REGULATIONS

Occupational Safety & Health (Classification, Labeling, and Safety Data Sheet of Hazardous Chemical) Regulation 2013.

The Industry Code of Practice on Chemical Classification and Hazard Communication 2014 (ICOP CCHC).

The Industry Code of Practice on Chemical Classification and Hazard Communication 2014 (Amendment) 2019) Part 1.

Occupational Safety & Health (Use and Standards of Exposure of Chemicals Hazardous to Health) Regulation 2000.

Environmental Quality Act 1974.

Classified as Poison in Part II in the First Schedule of Poison Act 1952.

Regulations for ingredients

Hydrochloric Acid (CAS: 7647-01-0) is found on the following regulatory lists;

"CODEX General Standard for Food Additives (GSFA) - Additives Permitted for Use in Food in General, Unless Otherwise Specified, in Accordance with GMP", "GESAMP/EHS Composite List - GESAMP Hazard Profiles", "IMO IBC Code Chapter 17: Summary of minimum requirements", "IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk", "International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs", "International Council of Chemical Associations (ICCA) - High Production Volume List", "International Maritime Dangerous Goods Requirements (IMDG Code) - Goods Forbidden for Transport", "OECD List of High Production Volume (HPV) Chemicals", "Singapore Environmental Protection and Management (Hazardous Substances) Regulations", "Singapore Environmental Protection and Management Act (EPMA) – Air Impurities", "Singapore Environmental Protection and Management Act (EPMA) - List of Controlled Hazardous Substances", "Singapore Misuse of Drugs Act Third Schedule Controlled Equipment, Materials or Substances Useful for Manufacturing Controlled Drugs Part I", "Singapore Odour Thresholds and Irritation Concentration of Chemicals", "Singapore Permissible Exposure Limits of Toxic Substances", "United Nations Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances - Table II", "United Nations List of Precursors and Chemicals Frequently used in the Illicit Manufacture of Narcotic Drugs and Psychotropic Substances Under International Control (Red List) - Table II", "WHO Guidelines for Drinking-water Quality - Chemicals for which guideline values have not been established".

Water (CAS: 7732-18-5) is found on the following regulatory lists;

"IMO IBC Code Chapter 18: List of products to which the Code does not apply", "International Fragrance Association (IFRA) Survey: Transparency List", "OECD List of High Production Volume (HPV) Chemicals", "OSPAR National List of Candidates

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for Substitution Norway".

SECTION 16: OTHER INFORMATION

LEGEND

- ppm : Part per million
 - CAS : Chemical Abstracts Service Registry Number
 - OSF : Odour Safety Factor
 - RTECS : Register of Toxic Effects of Chemical Substances.
 - CPR : Cardiopulmonary resuscitation (CPR)
 - OSHA : Occupational Safety & Health Act
-
- Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the MSCI Classification committee using available literature references.
 - The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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