



CHLOROACETIC ACID, REAGENT (ACS)

GFS Chemicals, Inc.

Version No: 2.2

Safety Data Sheet according to Work Health and Safety Regulations (Hazardous Chemicals) 2023 and ADG requirements

Chemwatch Hazard Alert Code: 4

Initial Date: 26/10/2022

Revision Date: 31/05/2023

Print Date: 08/04/2026

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SECTION 1 Identification of the substance / mixture and of the company / undertaking

Product Identifier

Product name	CHLOROACETIC ACID, REAGENT (ACS)
Chemical Name	Not Available
Synonyms	MONOCHLOROACETIC ACID
Proper shipping name	CHLOROACETIC ACID, SOLID
Chemical formula	C ₂ H ₃ ClO ₂
Other means of identification	Not Available
CAS number	79-11-8

Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	professional, scientific and technical activities other professional, scientific and technical activities
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Details of the manufacturer or importer of the safety data sheet

Registered company name	GFS Chemicals, Inc.	GFS CHEMICALS INC
Address	155 Hidden Ravines Dr., Powell OH 43065 United States	155 Hidden Ravines Dr., Powell OH 43065 United States
Telephone	+1 740-881-5501	+1 740-881-5501
Fax	Not Available	Not Available
Website	www.gfschemicals.com	www.gfschemicals.com
Email	service@gfschemicals.com	service@gfschemicals.com

Emergency telephone number

Association / Organisation	Chemtrec	Chemtrec
Emergency telephone number(s)	+61-290372994 (Australia)	(800)262-8200 (US)
Other emergency telephone number(s)	+1-703-741-550 (International)	+1-703-741-550 (International)

SECTION 2 Hazards identification

Classification of the substance or mixture

Poisons Schedule	Not Applicable
Classification ^[1]	Acute Toxicity (Oral) Category 3, Acute Toxicity (Dermal) Category 3, Skin Corrosion/Irritation Category 1B, Serious Eye Damage/Eye Irritation Category 1, Acute Toxicity (Inhalation) Category 2, Specific Target Organ Toxicity - Single Exposure (Respiratory Tract Irritation) Category 3, Carcinogenicity Category 2, Hazardous to the Aquatic Environment Acute Hazard Category 2
Legend:	1. Classified by Chemwatch; 2. Classification drawn from HCIS; 3. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI

CHLOROACETIC ACID, REAGENT (ACS)

Label elements

Hazard pictogram(s)	
Signal word	Danger

Hazard statement(s)

H301	Toxic if swallowed.
H311	Toxic in contact with skin.
H314	Causes severe skin burns and eye damage.
H330	Fatal if inhaled.
H335	May cause respiratory irritation.
H351	Suspected of causing cancer.
H401	Toxic to aquatic life.

Precautionary statement(s) Prevention

P260	Do not breathe dust/fume.
P264	Wash all exposed external body areas thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves, protective clothing, eye protection and face protection.
P273	Avoid release to the environment.
P284	[In case of inadequate ventilation] wear respiratory protection.
P202	Do not handle until all safety precautions have been read and understood.

Precautionary statement(s) Response

P301+P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor/physician/first aider.
P301+P330+P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. If more than 15 mins from Doctor, INDUCE VOMITING (if conscious).
P303+P361+P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower].
P304+P340	IF INHALED: Remove person to fresh air and keep 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.
P308+P313	IF exposed or concerned: Get medical advice/ attention.
P302+P352	IF ON SKIN: Wash with plenty of water.
P363	Wash contaminated clothing before reuse.
P361+P364	Take off immediately all contaminated clothing and wash it before reuse.

Precautionary statement(s) Storage

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

Precautionary statement(s) Disposal

P501	Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation.
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No further product hazard information.

SECTION 3 Composition / information on ingredients

Substances

CAS No	%[weight]	Name
79-11-8	100	<u>chloroacetic acid</u>

Legend: 1. Classified by Chemwatch; 2. Classification drawn from HCIS; 3. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI; 4. Classification drawn from C&L; * EU IOELVs available

Mixtures

CHLOROACETIC ACID, REAGENT (ACS)

See section above for composition of Substances

SECTION 4 First aid measures

Description of first aid measures

Eye Contact	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 Contact	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. ▶ Transport to hospital, or doctor.
Inhalation	▶ 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 authorised by him/her. (ICSC13719)
Ingestion	▶ IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY. ▶ For advice, contact a Poisons Information Centre or a doctor. ▶ Urgent hospital treatment is likely to be needed. ▶ In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition. ▶ If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the SDS should be provided. Further action will be the responsibility of the medical specialist. ▶ If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the SDS. Where medical attention is not immediately available or where the patient is more than 15 minutes from a hospital or unless instructed otherwise: ▶ INDUCE vomiting with fingers down the back of the throat, ONLY IF CONSCIOUS. Lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. NOTE: Wear a protective glove when inducing vomiting by mechanical means.

Indication of any immediate medical attention and special treatment needed

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 dessicating 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 neutralise 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.
- ▶ 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.

Continued...

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- ▶ 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]

For poisonings involving monochloroacetate the following regime is advised (compare that for fluoroacetate):

Experimental antidotes against fluoroacetate are said to be effective against chloroacetate. These include monoacetin (glycerol monoacetate), acetamide or ethanol

- ▶ Induce vomiting immediately if possible.
- ▶ Gastric lavage with tap water unless convulsions/imminent convulsions make this impracticable.
- ▶ Instill into the stomach sodium or magnesium sulfate in water (15-30 gm).
- ▶ Although the clinical efficacy of monoacetin (glycerol monoacetate) is not established, it should probably be administered if available. The recommended dose is 0.5 ml/kg of undiluted fluid intramuscularly every half-hour for several hours and then at a reduced level for at least 12 hours. In the same dose monacetin may also be given intravenously after dilution with 5 parts of sterile isotonic saline. No preparation of monoacetin is known to be available on the market. Usual commercial fluid contains free glycerin and assays at 70% at best. even the use of nonsterile preparations must be considered. Injection may be expected to produce some sedation and vasodilation. Intramuscular injection sites must be varied because of local pain and oedema. Should parenteral administration be not feasible, the patient may drink a mixture of 100 ml of monacetin in 500 ml water. Repeat every hour.
- ▶ If monoacetin is not available, acetamide or ethanol may be given in the same doses.
- ▶ A short-acting barbiturate drug or diazepam may be tried to control convulsions.
- ▶ Oxygen therapy and artificial ventilation as required.
- ▶ It is doubtful that digitalis is ever warranted. Parenteral procainamide or quinidine may be given a therapeutic trial but in experimental poisonings these drugs have proved less successful than monacetin in controlling cardiac arrhythmias.
- ▶ If possible, monitor the electrocardiogram continuously and secure chest electrodes for external defibrillation if it becomes necessary. [GOSSELIN, SMITH HODGE: Clinical Toxicology of Commercial Products 5th Ed]

Depending on the degree of exposure, periodic medical examination is indicated. The symptoms of lung oedema often do not manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation is therefore essential. Immediate administration of an appropriate spray, by a doctor or a person authorised by him/her should be considered.

(ICSC24419/24421

SECTION 5 Firefighting measures

Extinguishing media

- ▶ Water spray or fog.
- ▶ Foam.
- ▶ Dry chemical powder.
- ▶ BCF (where regulations permit).
- ▶ Carbon dioxide.

Special hazards arising from the substrate or mixture

Fire Incompatibility	▶ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result
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Advice for firefighters

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.
Fire/Explosion Hazard	▶ Combustible. ▶ Slight fire hazard when exposed to heat or flame. ▶ 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 acrid smoke and corrosive fumes. Combustion products include: ▶ carbon monoxide (CO) , ▶ carbon dioxide (CO₂) , - hydrogen chloride , - phosgene , ▶ other pyrolysis products typical of burning organic material.
HAZCHEM	2X

SECTION 6 Accidental release measures

Continued...

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Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

Minor Spills	▶ Clean up waste regularly and abnormal spills immediately. ▶ Avoid breathing dust and contact with skin and eyes. ▶ Wear protective clothing, gloves, safety glasses and dust respirator. ▶ Use dry clean up procedures and avoid generating dust. ▶ Vacuum up or sweep up. NOTE: Vacuum cleaner must be fitted with an exhaust micro filter (H-Class HEPA type) (consider explosion-proof machines designed to be grounded during storage and use). H-Class HEPA filtered industrial vacuum cleaners should NOT be used on wet materials or surfaces. ▶ Dampen with water to prevent dusting before sweeping. ▶ Place in suitable containers for disposal. ▶ 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.
Major Spills	▶ DO NOT touch the spill material ▶ 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.

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

SECTION 7 Handling and storage

Precautions for safe handling

Safe handling	▶ Avoid skin contact, including inhalation. ▶ Wear protective clothing when risk of exposure occurs. ▶ Use in a well-ventilated area. ▶ Prevent concentration in hollows and sumps. ▶ DO NOT enter confined spaces until atmosphere has been checked. ▶ DO NOT allow material to come in direct contact with human skin or eyes. ▶ DO NOT allow material to come in contact with exposed food or food contact surfaces. ▶ Suitable PPE must be worn at all times. ▶ 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 SDS. ▶ Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained. ▶ Organic powders when finely divided over a range of concentrations regardless of particulate size or shape and suspended in air or some other oxidizing medium may form explosive dust-air mixtures and result in a fire or dust explosion (including secondary explosions) ▶ Minimise airborne dust and eliminate all ignition sources. Keep away from heat, hot surfaces, sparks, and flame. ▶ Establish good housekeeping practices. ▶ Remove dust accumulations on a regular basis by vacuuming or gentle sweeping to avoid creating dust clouds. ▶ Use continuous suction at points of dust generation to capture and minimise the accumulation of dusts. Particular attention should be given to overhead and hidden horizontal surfaces to minimise the probability of a "secondary" explosion. According to NFPA Standard 654, dust layers 1/32 in. (0.8 mm) thick can be sufficient to warrant immediate cleaning of the area. ▶ Do not use air hoses for cleaning. ▶ Minimise dry sweeping to avoid generation of dust clouds. Vacuum dust-accumulating surfaces and remove to a chemical disposal area. Vacuums with explosion-proof motors should be used. ▶ Control sources of static electricity. Dusts or their packages may accumulate static charges, and static discharge can be a source of ignition. ▶ Solids handling systems must be designed in accordance with applicable standards (e.g. NFPA including 654 and 77) and other national guidance.
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	▶ Do not empty directly into flammable solvents or in the presence of flammable vapors. ▶ The operator, the packaging container and all equipment must be grounded with electrical bonding and grounding systems. Plastic bags and plastics cannot be grounded, and antistatic bags do not completely protect against development of static charges. Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source. ▶ Do NOT cut, drill, grind or weld such containers. ▶ In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.
Other information	▶ 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.

Conditions for safe storage, including any incompatibilities

Suitable container	▶ Glass container is suitable for laboratory quantities ▶ 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, there must be sufficient inert cushioning material in contact with inner and outer packages *. - In addition, where inner packagings are glass and contain liquids of packing group I and II there must be sufficient inert absorbent to absorb any spillage *. - * unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic. All inner and sole packagings for substances that have been assigned to Packaging Groups I or II on the basis of inhalation toxicity criteria, must be hermetically sealed.
Storage incompatibility	Chloroacetic acid: ▶ is a strong acid in aqueous solution; reacts violently with strong bases ▶ is in compatible with sulfuric acid, ammonia, alcohols, amines, alkanolamines, alkylene oxides, cyanides, epichlorohydrin, isocyanates, strong oxidisers, sulfides ▶ attacks some plastics, rubbers and coatings, including nitrile rubber, PVC and polyvinyl alcohol (PVA) ▶ attacks most metals in the presence of moisture ▶ Contact with moisture or water may generate heat ▶ Reacts with mild steel, galvanised steel / zinc producing hydrogen gas which may form an explosive mixture with air. ▶ Avoid storage with reducing agents. ▶ Avoid strong bases.

SECTION 8 Exposure controls / personal protection

Control parameters

Occupational Exposure Limits (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
Australia Exposure Standards	chloroacetic acid	Monochloroacetic acid	0.3 ppm / 1.2 mg/m3	Not Available	Not Available	Not Available
Australia Workplace exposure limits for airborne contaminants (WEL list) (Effective from 1 December 2026) - Appendix A - Workplace Exposure Limits	chloroacetic acid	Monochloroacetic acid	0.5 ppm / 2 mg/m3	Not Available	Not Available	Not Available

MATERIAL DATA

For chloroacetic acid;

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OES TWA: 0.3 ppm, 1.2 mg/m³ (skin) *

Odour Threshold Value: < 5 ppm

Monochloroacetic acid (MCA) is a strong acids which causes severe burns to the skin, eyes and respiratory tract. Skin exposure to molten MCA may be lethal. the perception of mucous membrane irritation in humans is reportedly 1.5 ppm (5.7 mg/m³). A workplace environmental exposure limit (WEEL) has been proposed by the AIHA * and is thought to be low enough to prevent irritation whilst protecting against systemic toxicity.

Exposure limits with "skin" notation indicate that vapour and liquid may be absorbed through intact skin. Absorption by skin may readily exceed vapour inhalation exposure. Symptoms for skin absorption are the same as for inhalation. Contact with eyes and mucous membranes may also contribute to overall exposure and may also invalidate the exposure standard.

Exposure controls

Appropriate 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. ▶ Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction. ▶ Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace. ▶ If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered. Such protection might consist of: (a): particle dust respirators, if necessary, combined with an absorption cartridge; (b): filter respirators with absorption cartridge or canister of the right type; (c): fresh-air hoods or masks ▶ Build-up of electrostatic charge on the dust particle, may be prevented by bonding and grounding. ▶ Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to efficiently remove the contaminant. <table border="1"> <thead> <tr> <th>Type of Contaminant:</th><th>Air Speed:</th></tr> </thead> <tbody> <tr> <td>direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)</td><td>1-2.5 m/s (200-500 ft/min)</td></tr> <tr> <td>grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).</td><td>2.5-10 m/s (500-2000 ft/min)</td></tr> </tbody> </table> Within each range the appropriate value depends on: <table border="1"> <thead> <tr> <th>Lower end of the range</th><th>Upper end of the range</th></tr> </thead> <tbody> <tr> <td>1: Room air currents minimal or favourable to capture</td><td>1: Disturbing room air currents</td></tr> <tr> <td>2: Contaminants of low toxicity or of nuisance value only</td><td>2: Contaminants of high toxicity</td></tr> <tr> <td>3: Intermittent, low production.</td><td>3: High production, heavy use</td></tr> <tr> <td>4: Large hood or large air mass in motion</td><td>4: Small hood-local control only</td></tr> </tbody> </table> Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 4-10 m/s (800-2000 ft/min) for extraction of crusher dusts generated 2 metres distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.	Type of Contaminant:	Air Speed:	direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 ft/min)	grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5-10 m/s (500-2000 ft/min)	Lower end of the range	Upper end of the range	1: Room air currents minimal or favourable to capture	1: Disturbing room air currents	2: Contaminants of low toxicity or of nuisance value only	2: Contaminants of high toxicity	3: Intermittent, low production.	3: High production, heavy use	4: Large hood or large air mass in motion	4: Small hood-local control only
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Individual protection measures, such as personal protective equipment																	
Eye and face protection	▶ 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. [AS/NZS 1337.1, EN166 or national equivalent] ▶ 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 lenses 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].																

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Skin protection	See Hand protection below
Hands/feet protection	▶ Elbow length PVC gloves The selection of 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. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended. 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. · Some glove polymer types are less affected by movement and this should be taken into account when considering gloves for long-term use. · Contaminated gloves should be replaced. As defined in ASTM F-739-96 in any application, gloves are rated as: · Excellent when breakthrough time > 480 min · Good when breakthrough time > 20 min · Fair when breakthrough time < 20 min · Poor when glove material degrades For general applications, gloves with a thickness typically greater than 0.35 mm, are recommended. It should be emphasised that glove thickness is not necessarily a good predictor of glove resistance to a specific chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material. Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough times. Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturers technical data should always be taken into account to ensure selection of the most appropriate glove for the task. Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example: · Thinner gloves (down to 0.1 mm or less) may be required where a high degree of manual dexterity is needed. However, these gloves are only likely to give short duration protection and would normally be just for single use applications, then disposed of. · Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical) risk i.e. where there is abrasion or puncture potential Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.
Body protection	See Other protection below
Other protection	▶ Overalls. ▶ PVC Apron. ▶ PVC protective suit may be required if exposure severe. ▶ Eyewash unit. ▶ Ensure there is ready access to a safety shower.

Recommended material(s)

GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the: **"Forsberg Clothing Performance Index"**.

The effect(s) of the following substance(s) are taken into account in the **computer-generated** selection:

CHLOROACETIC ACID, REAGENT (ACS)

Material	CPI
BUTYL	A
NEOPRENE	A
PE	A
VITON	A
PVC	C

* CPI - Chemwatch Performance Index

A: Best Selection

B: Satisfactory; may degrade after 4 hours continuous immersion

C: Poor to Dangerous Choice for other than short term immersion

NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. -

* Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice

Respiratory protection

Full face respirator with supplied air.

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 10 x ES	P1 Air-line*	-	PAPR-P1 -
up to 50 x ES	Air-line**	P2	PAPR-P2
up to 100 x ES	-	P3	-
		Air-line*	-
100+ x ES	-	Air-line**	PAPR-P3

* - Negative pressure demand ** - Continuous flow

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)

- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress

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of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

Ansell Glove Selection

Glove — In order of recommendation
AlphaTec 02-100
AlphaTec® 38-612
DermaShield™ 73-711
MICROFLEX® 63-864
MICROFLEX® 73-847
MICROFLEX® Diamond Grip® MF-300
MICROFLEX® NeoPro® NPG-888
MICROFLEX® Neogard® C52
TouchNTuff® 83-500
TouchNTuff® 73-500

The suggested gloves for use should be confirmed with the glove supplier.

due to personal protective equipment (powered, positive flow, full face apparatus may be an option).

- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory protection. These may be government mandated or vendor recommended.

- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.

- Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU)

- Use approved positive flow mask if significant quantities of dust becomes airborne.

- Try to avoid creating dust conditions.

Class P2 particulate filters are used for protection against mechanically and thermally generated particulates or both.

P2 is a respiratory filter rating under various international standards, Filters at least 94% of airborne particles

Suitable for:

- Relatively small particles generated by mechanical processes eg. grinding, cutting, sanding, drilling, sawing.

- Sub-micron thermally generated particles e.g. welding fumes, fertilizer and bushfire smoke.

- Biologically active airborne particles under specified infection control applications e.g. viruses, bacteria, COVID-19, SARS

SECTION 9 Physical and chemical properties

Information on basic physical and chemical properties

Appearance	Not Available		
Physical state	Solid	Relative density (Water = 1)	1.40
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	>500
pH (as supplied)	< 1 aqueous solution	Decomposition temperature (°C)	Not Available
Melting point / freezing point (°C)	60	Viscosity (cSt)	viscosity 1.29 mPa.s (212 °F (100 °C))Kinematic viscosity 0.9187 mm²/s estimated
Initial boiling point and boiling range (°C)	189.3	Molecular weight (g/mol)	94.50 g/mol
Flash point (°C)	126.1	Taste	Not Available
Evaporation rate	Not Available	Explosive properties	Not Available
Flammability	Not Applicable	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Available	Surface Tension (dyn/cm or mN/m)	Not Applicable
Lower Explosive Limit (%)	Not Available	Volatile Component (%vol)	0%
Vapour pressure (kPa)	0.01 kPa (77 °F (25 °C))	Gas group	Not Available
Solubility in water	Miscible	pH as a solution (1%)	Not Available
Vapour density (Air = 1)	3.26	VOC g/L	Enter Text
Heat of Combustion (kJ/g)	Not Available	Ignition Distance (cm)	Not Available
Flame Height (cm)	Not Available	Flame Duration (s)	Not Available
Enclosed Space Ignition Time Equivalent (s/m3)	Not Available	Enclosed Space Ignition Deflagration Density (g/m3)	Not Available

SECTION 10 Stability and reactivity

Reactivity	See section 7
Chemical stability	▶ Unstable in the presence of incompatible materials. ▶ Product is considered stable.

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	► Hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 Toxicological information

Information on toxicological effects

a) Acute Toxicity	There is sufficient evidence to classify this material as acutely toxic.
b) Skin Irritation/Corrosion	There is sufficient evidence to classify this material as skin corrosive or irritating.
c) Serious Eye Damage/Irritation	There is sufficient evidence to classify this material as eye damaging or irritating
d) Respiratory or Skin sensitisation	Based on available data, the classification criteria are not met.
e) Mutagenicity	Based on available data, the classification criteria are not met.
f) Carcinogenicity	There is sufficient evidence to classify this material as carcinogenic
g) Reproductivity	Based on available data, the classification criteria are not met.
h) STOT - Single Exposure	There is sufficient evidence to classify this material as toxic to specific organs through single exposure
i) STOT - Repeated Exposure	Based on available data, the classification criteria are not met.
j) Aspiration Hazard	Based on available data, the classification criteria are not met.

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. Strong evidence exists that exposure to the material may produce serious irreversible damage (other than carcinogenesis, mutagenesis and teratogenesis) following a single exposure by inhalation. Mice, rats and guinea pigs, exposed for 1.5 and 60 minutes to air saturated with chloroacetic acid survived with only mild eye and nasal irritation. Mild hyperaemia of the lungs was observed at autopsy. Inhalation of vapours, aerosols (mists, fumes) or dusts, generated by the material during the course of normal handling, may produce toxic effects.
Ingestion	Strong evidence exists that exposure to the material may produce serious irreversible damage (other than carcinogenesis, mutagenesis and teratogenesis) following a single exposure by swallowing. 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. Ingestion of low-molecular organic acid solutions may produce spontaneous haemorrhaging, intravascular coagulation, gastrointestinal damage and oesophageal and pyloric stricture. Monochloroacetic acids and their salts are highly toxic in laboratory rodents and generally are irritating to both skin and eyes. Symptoms of intoxication include clonic and tonic convulsions, anuria and respiratory depression. In common with fluoroacetates, chloroacetates are uncompetitive inhibitors of acetate oxidation but, in addition, reduce the sulphydryl content of liver and kidney by acetylating -SH residues. Chloroacetates are at least 20 times more toxic than their dichloroacetic and monochloroacetic counterparts. Toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual.
Skin Contact	Strong evidence exists that exposure to the material may produce serious irreversible damage (other than carcinogenesis, mutagenesis and teratogenesis) following a single exposure by skin contact.

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	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 is not thought to have harmful health effects (as classified under EC Directives); the material may still produce health damage following entry through wounds, lesions or abrasions. 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. Human fatalities have occurred when chloroacetic acid covered 10% of skin area. Clinical symptoms involving a whole body drench included first degree burns to the skin and spitting up of blood, convulsions, loss of consciousness and death within 4 hours. Autopsy first-degree burns on the body, haemorrhage of the lungs, pleura membranes, liver, damage, and mucous membranes of the bronchia; point shaped bleedings of the epicardium, pleura and brain; spotted bleeding between the soft membranes of the brain; and the right heart cavities were dilated and filled with blood. In animal tests lethal results have followed from 3% skin area cover. Skin contact with the material may produce toxic effects; systemic effects may result following absorption.								
Eye	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. When applied to the eye(s) of animals, the material produces severe ocular lesions which are present twenty-four hours or more after instillation. Irritation of the eyes may produce a heavy secretion of tears (lachrymation). Dilute solutions of low-molecular organic acids cause conjunctival hyperaemia, prompt pain and corneal injury.								
Chronic	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. On the basis, primarily, of animal experiments, concern has been expressed that the material may produce carcinogenic or mutagenic effects; in respect of the available information, however, there presently exists inadequate data for making a satisfactory assessment. Repeated or long-term occupational exposure is likely to produce cumulative health effects involving organs or biochemical systems. Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems. In general, alpha-halocarboxylic acids and their esters are good alkylating agents and should be handled with care Alkylating agents may damage the stem cell which acts as the precursor to components of the blood. Loss of the stem cell may result in pancytopenia (a reduction in the number of red and white blood cells and platelets) with a latency period corresponding to the lifetime of the individual blood cells. Granulocytopenia (a reduction in granular leukocytes) develops within days and thrombocytopenia (a disorder involving platelets), within 1-2 weeks, whilst loss of erythrocytes (red blood cells) needs months to become clinically manifest. Aplastic anaemia develops due to complete destruction of the stem cells.								
CHLOROACETIC ACID, REAGENT (ACS)	<table> <tr> <th>TOXICITY</th><th>IRRITATION</th></tr> <tr> <td>Dermal (rabbit) LD50: 175 mg/kg^[2]</td><td>Eye: adverse effect observed (irreversible damage)^[1]</td></tr> <tr> <td>Inhalation (Rat) LC50: >1.268 mg/L4h^[1]</td><td>Skin: adverse effect observed (corrosive)^[1]</td></tr> <tr> <td>Oral (Rat) LD50: 76 mg/kg^[2]</td><td>Skin: adverse effect observed (irritating)^[1]</td></tr> </table>	TOXICITY	IRRITATION	Dermal (rabbit) LD50: 175 mg/kg ^[2]	Eye: adverse effect observed (irreversible damage) ^[1]	Inhalation (Rat) LC50: >1.268 mg/L4h ^[1]	Skin: adverse effect observed (corrosive) ^[1]	Oral (Rat) LD50: 76 mg/kg ^[2]	Skin: adverse effect observed (irritating) ^[1]
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Legend:	1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances								
CHLOROACETIC ACID	Equivocal tumorigen by RTECS criteria In high concentrations over a short period of time, exposure to haloacetic acids in drinking water can cause severe irritation to the skin. Trichloroacetic acid, a type of haloacetic acid, is used clinically as a chemical skin peel. Exposure to high levels of this acid causes loss of skin, inflammation and degeneration of the structural protein collagen. In some cases, the skin damage can last from two to 15 weeks. Experiments on mice exposed to varying levels of haloacetic acid showed an increase in the development of liver tumours and liver cancer. Exposure to high levels of haloacetic acid also may increase the risk of birth defects. However, as with cancer, only animal studies have been conducted. Fetal rats exposed to high doses of haloacetic acid in their mother's diets had poor fetal growth and a higher incidence of malformation of the heart and kidneys. Pregnant rats exposed to the contaminant also had poor overall maternal weight gain during gestation.								
CHLOROACETIC ACID, REAGENT (ACS) & CHLOROACETIC ACID	Asthma-like symptoms may continue for months or even years after exposure to the material ends. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur after exposure to high levels of highly irritating compound. Main criteria for diagnosing RADS include the absence of previous airways disease in a non-atopic individual, with sudden onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. Other criteria for diagnosis of RADS include a reversible airflow pattern on lung function tests, moderate to severe								

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bronchial hyperreactivity on methacholine challenge testing, and the lack of minimal lymphocytic inflammation, without eosinophilia. 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. On the other hand, industrial bronchitis is a disorder that occurs as a result of exposure due to high concentrations of irritating substance (often particles) and is completely reversible after exposure ceases. The disorder is characterized by difficulty breathing, 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 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*.

for monochloroacetic acid (MCA) and sodium monochloroacetate (SMCA)

The anticipated acute and chronic human health hazards posed by MCA/SMCA are effects on the cardiac system, the central nervous system, and kidneys. Chronic exposure may also result in hepatotoxicity and teratogenic effects (SMCA tested only). In addition, MCA is highly corrosive and irritating to the eyes, skin and respiratory tract.

The toxicity profile of MCA and SMCA are similar for the oral route of exposure. However, SMCA is much less toxic than MCA by the dermal route in acute studies indicating that dermal absorption of MCA is greater than for SMCA. Toxicity associated with inhalation exposure is difficult to determine for MCA because of poor study design and/or inadequate reporting of available studies: studies for SMCA are not available. However, due to the corrosive property of MCA and toxicity profile of MCA/SMCA it is prudent to recommend that exposure by the inhalation to MCA and SMCA should be avoided.

Acute dermal exposure of workers to MCA may result in death even after rapid and extensive washing of the skin area. The effects may be delayed. However, under "normal" exposure conditions with strict use of recommended protective measures it is envisaged that exposure and subsequent effects will be low. It has been suggested that oral and inhalation absorption may be limited because of the irritating effects of MCA and that the low odour threshold for MCA (0.01 ppm, 0.042 mg/m³) indicates good alert properties of the compound. In contrast, SMCA is less irritating and therefore oral, inhalation dermal exposure may occur unobserved. Because SMCA forms dusts, inhalation and dermal exposure may represent important routes of exposure.

The biochemical mechanism of action resulting in death is not understood. Contributing factors apparently believed to be involved are: (i) the inhibition of the tricarboxylic acid cycle decreasing cellular energy supply and increasing acidosis with glycolic acid and oxalate production, and; (ii) effects on cellular components where sulphydryl groups are critical for normal biological activity. Both of these effects may contribute to CNS, cardiovascular, renal and hepato effects. In addition, the metabolites glycolic acid and oxalates may contribute to CNS and renal toxicity.

Monofluoroacetic acid (MFA; CAS No. 144-49-0), moniodoacetic acid (MIA; CAS No. 64-69-7), monobromoacetic acid (MBA; CAS No. 79-08-3) and the sodium salts of MFA and MIA (CAS No. 62-74-8 and 305-53-3) are close structural analogues of MCA and SMCA. MFA is more toxic than MCA but it is also corrosive and may cause effects on the cardiac system, the central nervous system and kidneys which may result in death. However, MCA apparently has a different mechanism of action than its structural halo analogues. For example, both MCA and MFA inhibit aconitase required for acetate metabolism in the tricarboxylic acid cycle but their inhibition kinetics are different. In addition, MCA like MIA but unlike MFA depletes organ thiols. Hence, comparison of MCA or SMCA with its structural halo analogues for risk assessment or identifying antidotes should only be done with prudence.

Acute Toxicity	✓	Carcinogenicity	✓
Skin Irritation/Corrosion	✓	Reproductivity	✗
Serious Eye Damage/Irritation	✓	STOT - Single Exposure	✓
Respiratory or Skin sensitisation	✗	STOT - Repeated Exposure	✗
Mutagenicity	✗	Aspiration Hazard	✗

Legend: ✗ – Data either not available or does not fill the criteria for classification
✓ – Data available to make classification

SECTION 12 Ecological information

Toxicity

CHLOROACETIC ACID, REAGENT (ACS)	Endpoint	Test Duration (hr)	Species	Value	Source
	EC50	72h	Algae or other aquatic plants	0.025mg/l	1
	EC50	48h	Crustacea	71-85mg/l	4
	NOEC(ECx)	72h	Algae or other aquatic plants	0.006mg/l	1
	LC50	96h	Fish	71.7mg/l	2
Legend:	Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. US EPA, Ecotox database - Aquatic Toxicity Data 4. ECETOC Aquatic Hazard Assessment Data 5. NITE (Japan) - Bioconcentration Data 6. METI (Japan) - Bioconcentration Data 7. Vendor Data				

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

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Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.

Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

for trichloroacetic acid (TCA):

Environmental fate:

TCA represents a risk to both the hydrosphere as well as the soil compartment.

A potential risk to the aquatic compartment is identified due to high toxicity to algae and local exposure from use as auxiliary in textile dyes, waste water from electroplating facilities, textile washing and pulp mills. A potential risk to the terrestrial environment is identified due to high toxicity to plants and global exposure from the decomposition of C2-chlorocarbons.

TCA is stable in neutral solution and is classified as "non biodegradable" with a "low bioaccumulation potential" for fish and a "high bioaccumulation potential" for terrestrial plants. The most sensitive environmental species to TCA is the alga *Chlorella pyrenoidosa* (14 d-NOEC = 0.01 mg/l) and pine (60 d-EC10 = 0.12 mg/kg).

Of the three chloroacetic acids, trichloro had the longest residence time (induction and decay) (approximately 40 d), dichloro the shortest (approximately 4 d), and monochloro an intermediate residence time (approximately 14 d). Laboratory studies suggest that the biodegradation of trichloro-, dichloro-, and monochloroacetic acids leads primarily to the formation of chloride and oxalic, glyoxalic, and glycolic acids, respectively

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

For chloroacetic acid and sodium monochloroacetate (MCA and SMCA):

Environmental fate:

Chloroacetic acid does not appreciably absorb UV radiation above 290 nm and is therefore not expected to be directly photolysed. It photodechlorinates very slowly in air-saturated solutions with only <0.4 % being converted to free chloride when irradiated for 11 hours in a laboratory photoreactor (the rate significantly decreases after a few hours). Photodechlorination is much lower in the absence of oxygen. The presence of radiosensitisers such as p-cresol and tryptophan which generate superoxide anion radicals (O₂⁻) increase the rate of photodechlorination by up to 16-fold. Hydrolysis did not contribute to the degradation in these experiments.

Volatilisation from water/soil: Chloroacetic acid has a pKa of 2.86 and will be completely ionized at environmental pHs. Evaporation from water will therefore not be a significant loss process.

Atmospheric fate: MCA/SMCA released to the atmosphere, i.e. during production or pesticide spraying, is dissolved in water as an aerosol. The aerosol will be subject to gravitational settling and undergo slow photodechlorination. Degradation in the atmosphere is therefore expected to be low.

Biodegradation: Chloroacetic acid is degraded by greater than 70-90% within 5-10 days in laboratory biodegradation tests using sewage or acclimated sludge inocula. The degradation rate is increased by acclimation and involves dechlorination. In river water, 73% MCA/SMCA is mineralized to carbon dioxide in 8-10 days at 29 C. Even under anaerobic conditions the compound seems to be readily degraded to methane, CO₂ and chloride ions (86-90% reduction within 2 days at 34 C). Degradation occurs in soil, however, under acidic conditions and/or a low temperature MCA/SMCA is comparatively persistent.

Aquatic fate: MCA is mineralised in water (73% in 8-10 days), and is not appreciably adsorbed to sediment.

Chloroacetic acid has a very low log octanol/water partition coefficient, 0.22, and therefore is not expected to bioconcentrate in fish.

Terrestrial fate: When MCA/SMCA is released onto the soil surface, it will leach into the ground. Degradation occurs in the soil, however, under acidic conditions and/or at low temperature, MCA/SMCA is only slowly degraded. Chloroacetic acid has a very low log octanol/water partition coefficient, 0.22, and therefore is not expected to be appreciably adsorbed to soil particles.

Ecotoxicity:

MCA/SMCA are very highly toxic to aquatic and terrestrial plants and highly acute toxic to birds.

MCA/SMCA are low/moderate acute and chronic toxic to aquatic animals.

The anticipated ecotoxicological hazards posed by MCA/SMCA are low/moderate acute and chronic toxicity to aquatic animals. In acute studies with fish the acid form was more toxic than the salt form. This difference is probably a pH dependent effect. Acute toxicity data are available for three trophic levels. .

DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
chloroacetic acid	LOW (Half-life = 14 days)	MEDIUM (Half-life = 95.83 days)

Bioaccumulative potential

Ingredient	Bioaccumulation
chloroacetic acid	LOW (LogKOW = 0.22)

Mobility in soil

Ingredient	Mobility
chloroacetic acid	HIGH (Log KOC = 1.201)

SECTION 13 Disposal considerations**Waste treatment methods**

Product / Packaging disposal	- 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 SDS and observe all notices pertaining to the product.
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- ▶ **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.
 - ▶ 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: Mixing or slurring in water; Neutralisation with soda-lime or soda-ash followed by: burial in a land-fill specifically licensed to accept chemical and / or pharmaceutical wastes or Incineration in a licensed 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 Transport information

Labels Required

	 
Marine Pollutant	NO
HAZCHEM	2X

Land transport (ADG)

14.1. UN number or ID number	1751	
14.2. UN proper shipping name	CHLOROACETIC ACID, SOLID	
14.3. Transport hazard class(es)	Class	6.1
	Subsidiary Hazard	8
14.4. Packing group	II	
14.5. Environmental hazard	Not Applicable	
14.6. Special precautions for user	Special provisions	Not Applicable
	Limited quantity	500 g

Air transport (ICAO-IATA / DGR)

14.1. UN number	1751	
14.2. UN proper shipping name	Chloroacetic acid, solid	
14.3. Transport hazard class(es)	ICAO/IATA Class	6.1
	ICAO / IATA Subsidiary Hazard	8
	ERG Code	6C
14.4. Packing group	II	
14.5. Environmental hazard	Not Applicable	
14.6. Special precautions for user	Special provisions	Not Applicable
	Cargo Only Packing Instructions	675
	Cargo Only Maximum Qty / Pack	50 kg
	Passenger and Cargo Packing Instructions	668
	Passenger and Cargo Maximum Qty / Pack	15 kg
	Passenger and Cargo Limited Quantity Packing Instructions	Y644
	Passenger and Cargo Limited Maximum Qty / Pack	1 kg

Sea transport (IMDG-Code / GGVSee)

14.1. UN number	1751
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14.2. UN proper shipping name	CHLOROACETIC ACID, SOLID		
14.3. Transport hazard class(es)	IMDG Class	6.1	
	IMDG Subsidiary Hazard	8	
14.4. Packing group	II		
14.5 Environmental hazard	Not Applicable		
14.6. Special precautions for user	EMS Number	F-A, S-B	
	Special provisions	Not Applicable	
	Limited Quantities	500 g	

14.7. Maritime transport in bulk according to IMO instruments

14.7.1. Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

14.7.2. Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code

Product name	Group
chloroacetic acid	Not Applicable

14.7.3. Transport in bulk in accordance with the IGC Code

Product name	Ship Type
chloroacetic acid	Not Applicable

SECTION 15 Regulatory information

Safety, health and environmental regulations / legislation specific for the substance or mixture

chloroacetic acid is found on the following regulatory lists

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals
Australian Inventory of Industrial Chemicals (AIIC)

Additional Regulatory Information

Not Applicable

National Inventory Status

National Inventory	Status
Australia - AIIC / Australia Non-Industrial Use	Yes
Canada - DSL	Yes
Canada - NDSL	No (chloroacetic acid)
China - IECSC	Yes
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	Yes
Korea - KECI	Yes
New Zealand - NZIoC	Yes
Philippines - PICCS	Yes
USA - TSCA	All chemical substances in this product have been designated as TSCA Inventory 'Active'
Taiwan - TCSI	Yes
Mexico - INSQ	Yes
Vietnam - NCI	Yes
Russia - FBEPH	Yes
UAE - Control List (Banned/Restricted Substances)	No (chloroacetic acid)
Legend:	Yes = All CAS declared ingredients are on the inventory

CHLOROACETIC ACID, REAGENT (ACS)

National Inventory	Status
	No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration.

SECTION 16 Other information

Revision Date	31/05/2023
Initial Date	26/10/2022

SDS Version Summary

Version	Date of Update	Sections Updated
1.2	31/05/2023	Toxicological information - Acute Health (eye), Toxicological information - Acute Health (inhaled), Toxicological information - Acute Health (skin), Toxicological information - Acute Health (swallowed), Toxicological information - Chronic Health, Hazards identification - Classification, Disposal considerations - Disposal, Ecological Information - Environmental, Firefighting measures - Fire Fighter (fire/explosion hazard), First Aid measures - First Aid (swallowed), Exposure controls / personal protection - Personal Protection (eye), Exposure controls / personal protection - Personal Protection (hands/feet), Accidental release measures - Spills (minor), Identification of the substance / mixture and of the company / undertaking - Supplier Information

Other information

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.

Definitions and abbreviations

- ▶ PC - TWA: Permissible Concentration-Time Weighted Average
- ▶ PC - STEL: Permissible Concentration-Short Term Exposure Limit
- ▶ IARC: International Agency for Research on Cancer
- ▶ ACGIH: American Conference of Governmental Industrial Hygienists
- ▶ STEL: Short Term Exposure Limit
- ▶ TEEL: Temporary Emergency Exposure Limit,
- ▶ IDLH: Immediately Dangerous to Life or Health Concentrations
- ▶ ES: Exposure Standard
- ▶ OSF: Odour Safety Factor
- ▶ NOAEL: No Observed Adverse Effect Level
- ▶ LOAEL: Lowest Observed Adverse Effect Level
- ▶ TLV: Threshold Limit Value
- ▶ LOD: Limit Of Detection
- ▶ OTV: Odour Threshold Value
- ▶ BCF: BioConcentration Factors
- ▶ BEI: Biological Exposure Index
- ▶ DNEL: Derived No-Effect Level
- ▶ PNEC: Predicted no-effect concentration
- ▶ MARPOL: International Convention for the Prevention of Pollution from Ships
- ▶ IMSBC: International Maritime Solid Bulk Cargoes Code
- ▶ IGC: International Gas Carrier Code
- ▶ IBC: International Bulk Chemical Code

- ▶ AIIC: Australian Inventory of Industrial Chemicals
- ▶ DSL: Domestic Substances List
- ▶ NDSL: Non-Domestic Substances List
- ▶ IECSC: Inventory of Existing Chemical Substance in China
- ▶ EINECS: European Inventory of Existing Commercial chemical Substances
- ▶ ELINCS: European List of Notified Chemical Substances
- ▶ NLP: No-Longer Polymers
- ▶ ENCS: Existing and New Chemical Substances Inventory
- ▶ KECI: Korea Existing Chemicals Inventory
- ▶ NZIoC: New Zealand Inventory of Chemicals
- ▶ PICCS: Philippine Inventory of Chemicals and Chemical Substances
- ▶ TSCA: Toxic Substances Control Act
- ▶ TCSI: Taiwan Chemical Substance Inventory
- ▶ INSQ: Inventario Nacional de Sustancias Químicas
- ▶ NCI: National Chemical Inventory
- ▶ FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances