



# Safety Data Sheet (SDS)

## PERCHLORIC ACID

### Section 1: Product and Company Identification

<b>Product Name:</b>	PERCHLORIC ACID	<b>Index Number:</b>	017-006-00-4
<b>Product Number(s):</b>	S010201, S010201-SSEC03, S010201-SSEC04, S010201-SSEC05, S010201-SSEC06, S010201-SSEC09, S010201-SSEC10, S010201-SSEC41, S010201-SSEC61, S010201-SSEC63, S010201-SSED14, S010201-SSEE03, S010201-SSEE04, S010201-SSEE05, S010201-SSEE06, S010201-SSEE09, S010201-SSEE10, S010201-SSEG03, S010201-SSEG04, S010201-SSEG09, S010201-SSEG10, S010201-SSEG41, S010201-SSEG61, S010201-SSNC03, S010201-SSNC04, S010201-SSNC05, S010201-SSNC06, S010201-SSNC09, S010201-SSNC10, S010201-SSNC41, S010201-SSNC61, S010201-SSNC63, S010201-SSND14, S010201-SSNG03, S010201-SSNG04, S010201-SSNG09, S010201-SSNG10, S010201-SSNG41, S010201-SSNG61, S010201-SSNQ03, S010201-SSNQ09, S020201, S020201-SSEF01, S020201-SSEF02, S020201-SSEF03, S020201-SSEF04, S020201-SSEF05, S020201-SSEF06, S020201-SSEF07, S020201-SSEF08, S020201-SSNF01, S020201-SSNF02, S020201-SSNF03, S020201-SSNF04, S020201-SSNF05, S020201-SSNF06, S020201-SSNF07, S020201-SSNF08, S020201-SSRF01, S020201-SSRF02, S020201-SSRF03, S020201-SSRF04, S020201-SSRF05, S020201-SSRF06, S020201-SSRF07, S020201-SSRF08		
<b>Synonyms:</b>	Dioxonium perchlorate; Hydronium perchlorate		
<b>Chemical names:</b>	DE Perchlorsäure; ES Ácido perclórico; FR Acide perchlorique; IT Acido perclorico; NL Perchloorzuur		
<b>Supplier:</b>	SEASTAR CHEMICALS Inc.		
<b>Address:</b>	10005 McDonald Park Road, Sidney, BC V8L 5Y2 CANADA		
<b>Phone Number:</b>	250-655-5880	<b>Fax Number:</b>	250-655-5888
<b>CANUTEC (CAN):</b>	613-996-6666		

### Section 2: Hazards Identification

Emergency Overview			
<b>Appearance:</b>	Colourless, oily liquid		
<b>Target Organs:</b>	Eyes, skin, thyroid, mucous membranes.		
GHS			
<b>Classification:</b>	Oxidizing liquid – Category 1 Skin corrosion – Category 1A Corrosive to metals – Category 1	<b>Pictograms:</b>	  GHS03                      GHS05
<b>Signal Word:</b>	Danger		

**Hazard Statements:**

**H271:** May cause fire or explosion; strong oxidizer.

**H314:** Causes severe skin burns and eye damage.

**H290:** May be corrosive to metals.

**Precautionary Statements:**

**P210:** Keep away from heat.

**P220:** Keep/Store away from clothing and other combustible materials.

**P221:** Take any precaution to avoid mixing with combustibles.

**P234:** Keep only in original container.

**P260:** Do not breathe fumes/gas/mist/vapours/spray.

**P264:** Wash thoroughly after handling.

**P280:** Wear protective gloves/protective clothing/eye protection/face protection.

**P283:** Wear fire/flammable resistant/retardant clothing.

**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.

**P306+P360:** IF ON CLOTHING: rinse immediately contaminated clothing and skin with plenty of water before removing clothes.

**P310:** Immediately call a POISON CENTER or doctor/physician.

**P363:** Wash contaminated clothing before reuse.

**P370+P378:** In case of fire: Perchloric acid does not burn, but is an oxidizer. Extinguish fire using extinguishing agent suitable for the surrounding fire and not contraindicated for use with perchloric acid. Flooding quantities of water spray or fog should be used to fight fires involving perchloric acid. DO NOT use dry chemical fire extinguishing agents containing ammonium compounds (such as some A:B:C agents), since an explosive compound can be formed. DO NOT use carbon dioxide, dry chemical powder or other extinguishing agents that smother flames, since they are not effective in extinguishing fires involving oxidizers.

**P371+P380+P375:** In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion.

**P390:** Absorb spillage to prevent material damage.

**P405:** Store locked up.

**P406:** Store in corrosion resistant container with a resistant inner liner.

**P501:** Dispose of contents/container to in accordance with local/regional/international regulations.

# SDS: PERCHLORIC ACID

## Section 3: Composition/Information on Ingredients

CAS No.	Chemical Name	Percent	EINECS / ELINCS No.
7601-90-3	Perchloric acid	60-72%	231-512-4
7732-18-5	Water	Balance	231-791-2

## Section 4: First Aid Measures

**In case of contact:**

<b>Inhalation:</b>	Can release corrosive compounds like chlorine. Take proper precautions to ensure your own safety before attempting rescue (e.g. wear appropriate protective equipment, use the buddy system). Remove source of contamination or move victim to fresh air. If breathing is difficult, trained personnel should administer emergency oxygen. DO NOT allow victim to move about unnecessarily. Symptoms of pulmonary edema can be delayed up to 48 hours after exposure. Quickly transport victim to an emergency care facility.
<b>Skin:</b>	Avoid direct contact. Wear chemical protective clothing, if necessary. As quickly as possible, remove contaminated clothing, shoes and leather goods. Immediately flush with lukewarm, gently flowing water for at least 30 minutes. DO NOT INTERRUPT FLUSHING. If necessary and it can be done safely, continue flushing during transport to emergency care facility. Quickly transport victim to an emergency care facility. Double bag, seal, label and leave contaminated clothing, shoes and leather goods at the scene for safe disposal.
<b>Eye:</b>	Avoid direct contact. Wear chemical protective gloves, if necessary. Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for at least 30 minutes, while holding the eyelid(s) open. If a contact lens is present, DO NOT delay irrigation or attempt to remove the lens. Neutral saline solution may be used as soon as it is available. DO NOT INTERRUPT FLUSHING. If necessary, continue flushing during transport to emergency care facility. Quickly transport victim to an emergency care facility.
<b>Ingestion:</b>	NEVER give anything by mouth if victim is rapidly losing consciousness, is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Have victim drink 60 to 240 mL (2 to 8 oz) of water. If vomiting occurs naturally, have victim rinse mouth with water again. Quickly transport victim to an emergency care facility.
<b>First Aid Comments</b>	Provide general supportive measures (comfort, warmth, rest). Consult a doctor and/or the nearest Poison Control Centre for all exposures. All first aid procedures should be periodically reviewed by a doctor familiar with the material and its conditions of use in the workplace.

## Section 5: Fire Fighting Measures

**Fire Hazard Summary:**

Perchloric acid solutions do not burn. However, perchloric acid is an oxidizing agent and is a serious fire and explosion hazard. Dilute (below 50%) or cold (below 49°C) perchloric acid solutions have little or no oxidizing power. Concentrated solutions (50-72%) are moderate to powerful oxidizing agents; decomposition produces large amounts of oxygen, which form an oxygen-rich atmosphere that promotes combustion. Perchloric acid solutions can cause combustible materials to ignite spontaneously and will support, accelerate and intensify the burning of combustible materials in a fire. Some substances that do not normally burn in air will ignite or explode upon contact with perchloric acid. Explosive decomposition may occur under fire conditions and closed containers may rupture violently due to rapid decomposition, if exposed to fire or excessive heat for a sufficient period of time. No part of a container should be subjected to a temperature higher than 49°C (120°F). During a fire, corrosive chlorine and hydrogen chloride gases and dangerously reactive and corrosive chlorine dioxide will be formed. Firefighter's normal protective equipment (Bunker Gear) will not provide adequate protection. Chemical protective clothing (e.g. chemical splash suit) and positive pressure self-contained breathing apparatus (NIOSH approved or equivalent) may be necessary.

<b>Extinguishing Media:</b>	Perchloric acid does not burn. Extinguish fire using extinguishing agent suitable for the surrounding fire and not contraindicated for use with perchloric acid. Perchloric acid is an oxidizer. Therefore, flooding quantities of water spray or fog should be used to fight fires involving perchloric acid.
<b>Extinguishing Media to be Avoided:</b>	DO NOT use dry chemical fire extinguishing agents containing ammonium compounds (such as some A:B:C agents), since an explosive compound can be formed. DO NOT use carbon dioxide, dry chemical powder or other extinguishing agents that smother flames, since they are not effective in extinguishing fires involving oxidizers.
<b>Flash Point:</b>	Not combustible (does not burn).
<b>Lower Flammable (Explosive) Limit (LFL/LEL):</b>	Not applicable
<b>Upper Flammable (Explosive) Limit (UFL/UEL):</b>	Not applicable
<b>Auto-ignition Temperature:</b>	Not applicable

# SDS: PERCHLORIC ACID

<b>Sensitivity to Mechanical Impact:</b>	Stable to shock.
<b>Sensitivity to Static Charge:</b>	Will not accumulate static charge or be ignited by a static discharge.
<b>Electrical Conductivity:</b>	$4.083 \times 10^{11}$ pS/m (25°C, anhydrous acid; higher for aqueous solutions)
<b>Minimum Ignition Energy:</b>	Not applicable
<b>Combustion and Thermal Decomposition Products:</b>	Chlorine/chlorine oxides, hydrogen chloride, oxygen (concentrated acid).

## NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) HAZARD IDENTIFICATION – Perchloric acid (>50% <72%)

<b>Health:</b>	3 – Short exposure could cause serious temporary or residual injury.
<b>Flammability:</b>	0 – Will not burn under typical fire conditions.
<b>Instability:</b>	3 – Capable of detonation or explosive decomposition or explosive reaction, but requires a strong initiating source or must be heated under confinement before initiation, or reacts explosively with water.
<b>Special Hazard:</b>	OXIDIZING MATERIAL

## Section 6: Accidental Release Measures

### Spill Precautions:

Restrict access to area until completion of clean-up. Ensure clean-up is conducted by trained personnel only. Wear adequate personal protective equipment. Remove all combustible and organic materials. Notify government environmental agencies if material is released into the environment.

### Clean-up:

Do not touch spilled material. Stop or reduce leak if safe to do so. Prevent material from entering sewers, waterways or confined spaces. Keep materials that can burn away from spilled material. Contain spill using non-combustible, non-reactive absorbent material free from contamination from organic material.

SMALL SPILLS: Neutralize acid by carefully adding soda ash ( $\text{Na}_2\text{CO}_3$ ). Transfer liquid to a container of water for disposal. Keep residue wet to prevent combustion upon drying. Flush area with water. LARGE SPILLS: Contact fire and emergency services and supplier for advice.

NOTE: If possible, neutralize the spill with a reducing agent such as sodium bisulfate or ferrous sulfate. The sludge is then transferred to a container of water and neutralized with soda ash. Flush area with water.

## Section 7: Handling and Storage

### Handling:

This material is a MILD to STRONG OXIDIZING AGENT and is also CORROSIVE (to eyes and skin). Before handling, it is very important that engineering controls are operating and that protective equipment requirements and personal hygiene measures are being followed. People working with this chemical should be properly trained regarding its hazards and its safe use. Maintenance and emergency personnel should be advised of potential hazards. Unprotected persons should avoid all contact with this chemical including contaminated equipment. Immediately report leaks, spills or failures of the engineering controls. If perchloric acid solution is spilled, immediately evacuate the area. Seek medical attention for all inhalation exposures even if an exposure did not seem excessive. Symptoms of a severe exposure can be delayed.

Do not allow perchloric acid to come into contact with strong dehydrating agents (concentrated sulphuric acid, anhydrous phosphorous pentoxide, etc.). Do not allow solutions to further concentrate by the evaporation of the water. Prevent contact with organic materials. Contact with combustible or flammable materials can cause fire or explosion. This material promotes combustion. It can react violently or explosively with many organic and inorganic chemicals. See Section 10 for more information.

Oxidizing power increases with concentration as well as temperature of the solution. Keep the material cool. Any use of this material in an elevated temperature process must be thoroughly evaluated to determine safe operating conditions. Use hot plates or steam baths to heat solutions rather than open flame heating or oil baths. In some circumstances, quartz rather than glass apparatus should be considered. Do not perform any welding, cutting, soldering, drilling or other hot work on an empty vessel, container or piping until all material has been cleared and has been confirmed 'clean'.

Use the smallest possible amounts in an area separate from the storage area. Avoid generating vapours (if heating) or mists. Prevent the release of vapours and mists into the workplace air. Use a fumehood or local exhaust system designed for perchloric acid use. Ensure that this device is properly maintained on a regular basis and is used appropriately by trained personnel.

Do not attempt to open a container if it is of unknown age or if its physical characteristics differ from the pure substance (such as colour change, crystal formation). The bottle containing perchloric acid solutions should be kept moist at all times to prevent the formation of explosive crystals between the bottle and the cap. To achieve this, the acid bottle should be stored inside a second bottle containing some water. Perform all operations on chemically resistant and nonabsorbent surfaces such as steel or epoxy composites.

# SDS: PERCHLORIC ACID

Avoid contact with cellulose materials such as wood, paper and cotton.

Inspect containers for damage or leaks before handling. Use the type of containers recommended by the manufacturer. To avoid splashing, carefully dispense into sturdy containers made of compatible materials. In general, add to cold water slowly, in small amounts and stir frequently to avoid excessive heat generation. Label containers. Handle containers carefully to avoid damage. Keep closed when not in use to avoid spillage or contamination of the contents.

Do not mix perchloric acid waste with any other waste. Trace amounts of contaminant may cause dangerous decomposition. Never return unused or contaminated material to its original container. Always assume that empty containers contain hazardous residues. Never reuse empty containers, even if they appear to be clean. Maintain handling equipment - prevent leaks of grease or other lubricants from equipment where this chemical is used. Have suitable emergency equipment for fires, spills and leaks readily available. Practice good housekeeping. Comply with applicable regulations.

## Storage:

Store in a cool, dry area, out of direct sunlight and away from heat and ignition sources. Storage area should be clearly identified, well-illuminated, clear of obstruction and accessible only to trained and authorized personnel. Keep quantities stored as small as possible. Containers should not be subjected to a temperature higher than 49°C (120°F).

If possible, store this material separately from other chemicals. If total segregation is not feasible, it may be stored with other inorganic acids. It must not come into contact with any organic materials, flammable or combustible materials or strong dehydrating agents such as sulphuric acid. See Section 10 for more information.

Discard the material if discolouration occurs. If a bottle containing perchloric acid has crystals forming around the bottom of the bottle, there is a potential explosion hazard. Do not move the bottle. Contact the supervisor for immediate assistance.

Construct walls, floors, ventilation system, pallets and shelving in storage areas from non-combustible and resistant materials that are compatible with perchloric acid (such as steel, tile, epoxy composites). Keep storage area separate from work areas. Post warning signs. Inspect storage area regularly for any deficiencies, including damaged or leaking containers, corrosion and poor housekeeping.

Inspect all incoming containers to make sure they are properly labelled and not damaged. Always store in original labelled container. Glass, ceramic or polyethylene containers are usually recommended. Protect the label and keep it visible. Keep containers tightly closed when not in use and when empty. Protect from damage. Store containers at a convenient height for handling, below eye level if possible. Keep empty containers tightly closed in separate storage area. Empty containers and storage trays may contain hazardous residues.

Have appropriate fire extinguishers and spill clean-up equipment in storage area. Keep absorbents or neutralizers for leaks and spills readily available. Contain spills or leaks by storing in trays made from compatible materials such as glass or porcelain. Wipe the trays periodically. Provide raised sills or ramps at doorways or create a trench which drains to a safe location. Floors should be watertight and without cracks. Store oxidizing materials according to the occupational health and safety regulations and fire and building codes which will describe the kind of storage area and the type of storage containers for a specified amount of the material.

## Section 8: Exposure Controls/Personal Protection

### General Exposure Precautions:

NOTE: Exposure to this material can be controlled in many ways. The measures appropriate for a particular worksite depend on how this material is used and on the extent of exposure. This general information can be used to help develop specific control measures. Ensure that control systems are properly designed and maintained. Comply with occupational, environmental, fire, and other applicable regulations.

### Engineering Controls:

Engineering control methods to reduce hazardous exposures are preferred. Methods include mechanical (local exhaust) ventilation, process or personnel enclosure, control of process conditions and process modification (e.g. substitution of a less hazardous material). Administrative controls and personal protective equipment may also be required.

Because of the high potential reactivity and fire hazard of perchloric acid, stringent control measures such as enclosure (closed handling system) or isolation are necessary, even for handling very small quantities. Do not use organic or combustible materials such as wood in the construction of ventilation or other control systems. Floors should be concrete or tile, not wood.

Use corrosion-resistant local exhaust ventilation, separate from other ventilation system along with enclosure (perchloric acid fume hood). Ventilation systems specifically designed for exhausting perchloric acid mist and vapour must be used. This system should have a functioning wash-down system. Flush the system for at least 20 -30 minutes at the end of each work session.

Exhaust hoods designed for perchloric acid should only be used for this purpose. Identify perchloric acid hoods with warning signs. Supply sufficient replacement air to make up for air removed by exhaust systems.

Any use of this material in an elevated temperature process must be thoroughly evaluated to determine safe operating conditions. An appropriate preventative maintenance program to prevent the accumulation of explosive perchloric acid salts in the ventilation hood and ducting should be developed and strictly followed. Consider testing to determine if acid or salts (perchlorates) are building up on surfaces including the inside of the ventilation system.

# SDS: PERCHLORIC ACID

## Personal Protective Equipment:

If engineering controls and work practices are not effective in controlling exposure to this material, then wear suitable personal protective equipment including approved respiratory protection. Have appropriate equipment available for use in emergencies such as spills or fire.

If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Refer to the CSA Standard Z94.4-93, "Selection, Use and Care of Respirators," available from the Canadian Standards Association, Rexdale, Ontario, M9W 1R3.

<b>Eye / Face protection:</b>	Wear chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166. A face shield may also be necessary.
<b>Skin protection:</b>	Wear impervious gloves and appropriate protective clothing. Choose body protection according to the amount and concentration of the substance at the work place. A chemical protective full-body encapsulating suit and respiratory protection may be required in some operations. Have a safety shower/eye-wash fountain readily available in the immediate work area.
<b>Resistance of Materials for Protective Clothing:</b>	Guidelines for Perchloric acid concentrations of 30-70%: RECOMMENDED (resistance to breakthrough longer than 8 hours): Butyl rubber; Natural rubber; Neoprene rubber; Nitrile rubber; Polyvinyl chloride; Tychem® BR/LV, Responder®, and TK. RECOMMENDED (resistance to breakthrough longer than 4 hours): Silver Shield/4H® (polyethylene/ethylene vinyl alcohol). NOT RECOMMENDED for use (resistance to breakthrough less than 1 hour): Polyvinyl alcohol.
<b>Inhalation / Ventilation:</b>	Use in a chemical fume hood. Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator with multi-purpose combination (US) or type B-P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
<b>Personal Hygiene:</b>	Remove contaminated clothing immediately and keep in closed containers. Discard or launder before re-wearing. Inform laundry personnel of contaminant's hazards. Do not eat, drink or smoke in work areas. Wash hands thoroughly after handling this material. Maintain good housekeeping. Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

## EXPOSURE GUIDELINES

None listed under NIOSH, ACGIH, or OSHA. OEL-Poland: 1 mg/m<sup>3</sup> TWA; 3 mg/m<sup>3</sup> STEL (Jan-1999)

## Section 9: Physical and Chemical Properties

<b>Form:</b>	Liquid	<b>Melting/Freezing Point:</b>	72.4% w/w: -18 °C (-0.4 °F)
<b>Colour:</b>	Clear, colourless	<b>Boiling Point:</b>	50.7% w/w: 132.4 °C (270.3 °F)
<b>Odour:</b>	Slight chlorine odour		61.2% w/w: 162.3 °C (324 °F)
<b>Chemical Formula:</b>	HClO <sub>4</sub>	<b>pH:</b>	Acidic
<b>Formula Weight:</b>	100.4576 g/mol	<b>Density: (@ 15 °C)</b>	50% w/w: 1.4103 g/mL
<b>Vapour Pressure:</b>	6.8 mm @ 25 °C		60% w/w: 1.5389 g/mL
<b>Vapour Density:</b>	3.46		70% w/w: 1.6736 g/mL
<b>Vapour Density:</b>	3.46	<b>Solubility:</b>	Soluble in water

## Section 10: Stability and Reactivity

Normally stable. The anhydrous form of this material is an explosion hazard. Pure, anhydrous perchloric acid and solutions >85% are extremely unstable; avoid dehydrating agents. Hygroscopic.

### Oxidizing Properties:

The NFPA lists perchloric acid solutions (less than 50% by weight) as Class 1 oxidizers, perchloric acid solutions (more than 50% but less than 60%) as Class 2 oxidizers, and perchloric acid solutions (60-72% by weight) as Class 3 oxidizers. A Class 1 oxidizer is an oxidizer whose primary hazard is that it slightly increases the burning rate but does not cause spontaneous ignition when it comes in contact with combustible materials. A Class 2 oxidizer will cause a moderate increase in the burning rate or cause spontaneous ignition of combustible materials with which it comes in contact. A Class 3 oxidizer will cause a severe increase in the burning rate of combustible materials with which it comes in contact or that will undergo vigorous self-sustained decomposition due to contamination or exposure to heat. Temperature also influences oxidizing strength. At 160°C and above, concentrated solutions are very powerful



# SDS: PERCHLORIC ACID

oxidizing agents. Although 68-72% perchloric acid behaves as a strong acid, it becomes a powerful oxidizer at elevated temperatures (greater than 160°C) or when anhydrous. It will be fairly readily dehydrated to the anhydrous acid with contact with strong concentrated acids.

## Incompatibility - Materials to Avoid:

NOTE: Chemical reactions that could result in a hazardous situation (e.g. generation of flammable or toxic chemicals, fire or detonation) are listed here. Many of these reactions can be done safely if specific control measures (e.g. cooling of the reaction) are in place. Although not intended to be complete, an overview of important reactions involving common chemicals is provided to assist in the development of safe work practices.

**WARNING:** *It is fairly easy to produce the dangerous anhydrous perchloric acid from either its salts or its aqueous solutions by heating with high boiling acids and dehydrating agents such as sulphuric acid and phosphorus pentoxide.*

COMBUSTIBLE MATERIALS (e.g. wood, cotton, wool, cloth, oils or grease) or CELLULOSE and DERIVATIVES (e.g. paper, wood fibres, sawdust) - contact with hot concentrated acid may cause ignition or a violent explosion. Many fires have been caused by the long-term contact of dilute acid with wood.

DEHYDRATING AGENTS (e.g. sulphuric acid, phosphorus pentoxide, phosphoric acid) - can explode spontaneously.

ACETIC ANHYDRIDE and ACETIC ACID - mixtures are sensitive to shock, heat and the introduction of organic contaminants. Vapours above the heated liquid are flammable.

ALCOHOLS (e.g. ethanol or methanol), BASES (e.g. sodium or potassium hydroxide), FLUORINE, TRICHLOROETHYLENE, ACETONITRILE, DIMETHYL ETHER, PHOSPHINE, PYRIDINE or NITRIC ACID and ORGANIC MATTER (e.g. vegetable oil, milk, plant material) - can react violently or explosively.

GLYCOLS (e.g. ethylene glycol), GLYCOL ETHERS (e.g. 2-ethoxyethanol), GLYCEROL, DIETHYL ETHER or KETONES - undergo violent decomposition in contact with 68-72% perchloric acid.

ANTIMONY COMPOUNDS (TRIVALENT) or BISMUTH - form explosive mixtures when hot.

STEEL - explosions have occurred when 72% perchloric acid came into contact with steel.

HYDRIODIC ACID, SODIUM IODIDE or SULFINYL CHLORIDE - ignite spontaneously on contact.

HYPOPHOSPHITES (e.g. sodium hypophosphite) or REDUCING AGENTS (e.g. charcoal or sodium phosphinate) - can explode violently upon heating

ORGANIC SULFOXIDES (e.g. dimethyl sulfoxide or dibutyl sulfoxide) - lower members of the series of salts formed are unstable and explosive when dry.

NITROGEN TRIIODIDE or NITROSOPHENOL - addition of concentrated acid causes explosion.

ANILINE and FORMALDEHYDE - react to form explosively combustible condensed resin.

<b>Hazardous Decomposition Products:</b>	No information is available for solutions of 72% or less. Chlorine/chlorine oxides, hydrogen chloride, oxygen (concentrated acid).
<b>Conditions to Avoid:</b>	Heat, combustible materials, other contaminants, dehydrating agents.
<b>Hazardous Polymerization:</b>	Does not occur.

## Corrosivity to Metals:

Perchloric acid solutions (10-70%) are corrosive (corrosion rate greater than 1.25 mm/year) to most common metals, such as stainless steel (e.g. types 304, 316, 403, 410, and 430), aluminum alloys 3003, Cast B-356 and other alloys, carbon steel alloys 1010, 1020, 1075 and 1095, cast iron (unspecified), gray and nickel cast iron, nickel, nickel-base alloy Monel, nickel-copper, copper, cartridge brass, naval brass, yellow brass, leaded red brass and silicon bronze at 21.1 °C (70 °F). They are not corrosive to Hastelloy C and C-276, Carpenter 20Cb-3 and high silicon cast iron (Duriron).

## Corrosivity to Non-Metals:

Perchloric acid solutions (10-70%) attack some plastics (such as Acrylonitrile-butadiene-styrene (ABS), Acetal copolymer, Noryl, Nylon, Phenolic, Polyesters (Bisphenol A, isophthalic and terephthalic), polychloroprene (above 21 °C), PVC (above 21 °C)), elastomers (neoprene (70%), nitrile Buna A, polymethyl methacrylate (70%), polyurethane and silicone rubbers) and some coatings. They do not attack chlorinated polyether (Penton), Chemraz, Kalrez, Kynar, Teflon, Halar, Hypalon, Tefzel, polyethylene (below 65 °C), polypropylene (below 93 °C), polyvinylidene chloride (Saran) and Viton A.

## Section 11: Toxicological Information

### Potential Health Effects

<b>Inhalation:</b>	May be fatal if inhaled. Perchloric acid does not readily form a vapour at room temperature. Therefore, inhalation exposure is unlikely to occur unless it is misted. Mists formed from solutions are probably severely irritating or corrosive to the nose, throat and lungs. A severe exposure may result in a potentially life-threatening accumulation of fluid in the lungs (pulmonary edema). Symptoms of pulmonary edema (pain in the chest and coughing) may be delayed up to 24 hours following exposure. If heated, perchloric acid forms corrosive gases.
--------------------	--

# SDS: PERCHLORIC ACID

<b>Skin:</b>	Solutions are corrosive to the skin. Depending on the concentration of the solution and the duration and degree of exposure, corrosive materials can cause severe burns, blistering and permanent scarring.
<b>Eye:</b>	Mists and splashes of solutions are corrosive to the eye. Depending on the concentration of the solution and the duration and degree of exposure, corrosive materials can cause permanent eye damage, including blindness.
<b>Ingestion:</b>	May be fatal if swallowed. Solutions are corrosive and ingestion can cause severe irritation or corrosive injury to the mouth, throat and stomach.
<b>Chronic:</b>	Prolonged or repeated inhalation may cause nosebleeds, nasal congestion, erosion of the teeth, perforation of the nasal septum, chest pain, and bronchitis. Repeated exposure may cause conjunctivitis, sensitization dermatitis and possible destruction and/or ulceration of the skin. To the best of our knowledge the chronic toxicity of this substance has not been fully investigated.

### Effects of Long-Term (Chronic) Exposure

<b>RTECS#:</b>	CAS# 7601-90-3: SC7500000; CAS# 7732-18-5: ZC0110000
<b>LD50/LC50:</b>	GTPZAB Gigiena Truda i Professional'nye Zabolevaniya: LD50 (lethal dose, 50% kill) Oral, rat – 1,100 mg/kg LD50 Subcutaneous, mouse – 250 mg/kg Behavioural: excitement; Lungs, Thorax or Respiration: dyspnea; Nutritional or Gross Metabolic: body temperature decrease.
<b>Epidemiology:</b>	No information available.
<b>Teratogenicity:</b>	No information available.
<b>Reproductive Effects:</b>	No information available.
<b>Neurotoxicity:</b>	No information available.
<b>Mutagenicity:</b>	No information available.
<b>Carcinogenicity:</b>	Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.

## Section 12: Ecological Information

**Ecotoxicity:** LC100 – Cyprinus carpio – 180 ppm/24H

## Section 13: Disposal Considerations

Review local/regional/international regulations or requirements prior to disposal. Store material for disposal as indicated in Storage Conditions. **Contaminated packaging:** Dispose of as unused product.

## Section 14: Transport Information

### US DEPARTMENT OF TRANSPORT (DOT) HAZARDOUS MATERIALS SHIPPING INFORMATION (49 CFR)

**Shipping Name and Description:** PERCHLORIC ACID with more than 50 percent but not more than 72 percent acid, by mass  
**Identification Number:** UN1873      **Hazard Class or Division:** 5.1      **Packing Group:** I

### CANADIAN TRANSPORTATION OF DANGEROUS GOODS (TDG) SHIPPING INFORMATION

**Shipping Name and Description:** PERCHLORIC ACID with more than 50 per cent but not more than 72 per cent acid, by mass  
**UN Number:** UN1873      **Class:** 5.1 (8)      **Packing Group/Category:** I  
**Special Provisions:** 68      **Marine Pollutant:** ---      **Passenger Carrying Road/Railway Vehicle Index:** Forbidden

### International Maritime Dangerous Goods (IMDG)

**Proper Shipping Name / Description:** PERCHLORIC ACID with more than 50% but not more than 72% acid, by mass  
**UN Number:** 1873      **Class or Division (Sub Risk):** 5.1 (8)      **Packing Group/Category:** I  
**Special Provisions:** 900      **Marine Pollutant:** ---      **EMS Number:** F-A, S-Q

### International Air Transport Association (IATA)

**Proper Shipping Name / Description:** Perchloric acid, 72% or less but more than 50% acid, by weight  
**UN/ID Number:** 1873      **Class or Division (Sub Risk):** 5.1 (8)      **Packing Group:** I  
**Special Provisions:** ---      **Passenger / Cargo Aircraft:** Forbidden      **Cargo Aircraft Only:** 553 Pkg Inst, 2.5 L Max Net

# SDS: PERCHLORIC ACID

## Section 15: Regulatory Information

Perchloric acid	CAS# 7601-90-3
<b>US Federal:</b>	
TSCA	Listed on the TSCA Inventory.
SARA Title III: Section 302	Not subject to the reporting requirements.
SARA Title III: Section 313	Does not exceed the threshold (De Minimis) reporting levels.
<b>US State:</b>	
Massachusetts Right To Know	Subject to this act, 10 lbs RQ.
Pennsylvania Right To Know	Subject to this act.
New Jersey Right To Know	Subject to this act, RTK# 2637.
California Prop. 65	Not subject to this act.
<b>Canada:</b>	
DSL/NDSL Status:	Is listed, record number: 8282
WHMIS Classifications:	C – Oxidizing material E – Corrosive material

## Section 16: Other Information

Revision Date:	07-2014, Supersedes 04-2011, 12-2010
----------------	--------------------------------------

*The statements contained herein are offered for informational purposes only and are based upon technical data. SEASTAR CHEMICALS Inc. believes them to be accurate but does not purport to be all-inclusive. The above-stated product is intended for use only by persons having the necessary technical skills and facilities for handling the product at their discretion and risk. Since conditions and manner of use are outside our control, we (SEASTAR CHEMICALS Inc) make no warranty of merchantability or any such warranty, express or implied with respect to information and we assume no liability resulting from the above product or its use. Users should make their own investigations to determine suitability of information and product for their particular purposes.*