

Material Safety Data Sheet

PERCHLORIC ACID

Print Date: September 2011

SECTION 1 – Chemical Product and Company Identification

MSDS Name: PERCHLORIC ACID MSDS Preparation Date: 09-2011, Supersedes 07-2008, 02-2007, 02-2004, 02-2001, 02-98

Synonyms: Dioxonium Perchlorate, Hydronium Perchlorate.

Chemical Names: DE Perchlorsäure; ES Ácido perclórico; FR Acide perchlorique; IT Acido perclorico; NL Perchloorzuur.

UN / NA Number(s): UN1873

Formula: HClO₄

Molecular Wt: 100.46

Product Numbers: S010201, S020201, S010201-SSNC03, S010201-SSNC04, S010201-SSNC06, S010201-SSNC09, S010201-SSNC41, S010201-SSNC61, S010201-SSNC63, S010201-SSNC65, S010201-SSND13, S010201-SSND14, S010201-SSNG04, S010201-SSNG09, S010201-SSNG41, S010201-SSNG61, S010201-SSNG65, S010201-SSNQ03, S010201-SSNQ09, S020201-SSNF01, S020201-SSNF02, S020201-SSNF03, S020201-SSNF04, S020201-SSNF05, S020201-SSNF06, S020201-SSNF07, S020201-SSNF08

Supplier: Seastar Chemicals Inc, 10005 McDonald Park Road, Sidney, BC V8L 5Y2 CANADA

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CANUTEC (CAN): (613)-996-6666

SECTION 2 – Composition/Information on Ingredients

<i>Chemical Name</i>	<i>Percent</i>	<i>CAS #</i>	<i>EINECS/ELINCS</i>
Perchloric Acid	60-72%	7601-90-3	231-512-4
Water	Balance	7732-18-5	231-791-2

SECTION 3 – Hazards Identification

EMERGENCY OVERVIEW

Appearance: Colourless, oily, odourless liquid. Concentrated acid is very hygroscopic (absorb moisture from the air). Will not burn. Concentrated acid can decompose at high temperatures forming corrosive gases such as chlorine, hydrogen chloride and chlorine dioxide. MILD to STRONG OXIDIZING AGENT depending on concentration of the solution and temperature. Promotes combustion. Contact with combustible or flammable materials can cause fire or explosion. Can react violently or explosively with many organic and inorganic chemicals. Vapours or mists are severely irritating to the respiratory tract. CORROSIVE to the eyes and skin. May cause blindness, severe burns and permanent scarring.

Target Organs: Eyes, thyroid, skin, mucous membranes.

Potential Health Effects

Primary Route(s) of Entry: Inhalation and ingestion. Skin contact. Eye contact.

Effects of Acute Exposure: Corrosive to skin and mucous membranes. Irritant.

LD50/LC50: CAS# 7601-90-3: Oral, rat: LD50 = 1100 mg/kg. CAS# 7732-18-5: Oral, rat: LD50 = >90 ml/kg

Eyes: Causes eye burns. May cause permanent eye damage, including blindness.

Skin: Causes skin burns, blisters and permanent scarring.

Ingestion: May be fatal if swallowed. Causes burns to the mouth, pharynx and gastrointestinal tract.

Inhalation: May be fatal if inhaled. May cause severe irritation of the respiratory tract with possible burns to the nose, throat and lungs. May cause coughing, shortness of breath, chest pain, and delayed pulmonary edema.

Effects of Chronic Exposure: Prolonged or repeated inhalation may cause nosebleeds, nasal congestion, erosion of the teeth, perforation of the nasal septum, chest pain, and bronchitis. Prolonged or repeated eye contact may cause conjunctivitis. Prolonged or repeated skin contact may cause sensitization dermatitis and possible destruction and/or ulceration. Chronic ingestion may cause effects similar to those of acute ingestion.

SECTION 4 – First Aid Measures

Eyes: Immediately flush eyes with copious amounts of water for at least 30 minutes, holding lids apart to ensure flushing of the entire surface. Get medical aid immediately.

Skin: Get medical aid immediately. Immediately flush skin with copious quantities of soap and water for at least 30 minutes while removing contaminated clothing and shoes. Call a physician.

Ingestion: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Consult a physician immediately. Never give anything by mouth to an unconscious person.

Inhalation: Can release corrosive compounds like chlorine. Remove patient from exposure to fresh air. Administer approved oxygen supply if breathing is difficult. Administer artificial respiration or CPR if breathing has ceased. Call a physician. Symptoms of pulmonary edema can be delayed up to 48 hours after exposure.

Notes to Physician: Treat symptomatically and supportively. Consult a doctor and/or the nearest Poison Control Centre for all exposures.

SECTION 5 – Fire Fighting Measures

General Information: Serious fire and explosion hazard. Concentrated solutions (50-72%) are moderate to powerful oxidizing agents and decompose giving off large amounts of oxygen. Can cause combustible materials to ignite spontaneously and will support, accelerate and intensify the burning of combustible materials in a fire. Explosive decomposition may occur under fire conditions and closed containers may rupture violently due to rapid decomposition. 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.

Extinguishing Media: 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. 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.

Auto-ignition Temperature: Not applicable.

Flash Point: Not applicable.

NFPA Rating: Health 3; Fire 0; Instability 3; Other OXIDIZING MATERIAL.

Explosion Limits: Lower: None available. Upper: None available.

Special Fire and Explosion Hazards: Oxidizing material – contributes to combustion of other materials. Avoid contact with organic substances.

SECTION 6 – Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Do not touch spilled material. 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.

Steps to be taken in case material is released or spilled: Small Spill: Perchloric acid is best disposed of by stirring it gradually into enough cold water to make its concentration less than 0.1%, neutralizing it with aqueous sodium hydroxide and washing the solution down the drain with at least 50 times its volume of water. Large Spill: Add weak reducing agent (e.g., Ferrous salts) to spill. Shovel sludge into large container of water and add soda lime to neutralize.

Waste disposal method: Small Spill: According to all applicable regulations. Large Spill: According to all applicable regulations.

SECTION 7 – Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before re-use. Use with adequate ventilation. Avoid contact with clothing and other combustible materials. Do not get on skin or in eyes. Do not ingest or inhale. Use with adequate ventilation.

Storage: Do not store near combustible materials. Store in a cool, dry place away from sparks and flame. Store in a tightly closed container. Do not add any other material to the container. Do not store near flammable substances. Handle in accordance with good storage and handling practices. Do not allow smoking or food consumption while handling. Do not store near organic substances. Do not get in eyes, on skin, or on clothing. Wash well after use. Product is highly hygroscopic. Wash thoroughly with water before marking "empty".

SECTION 8 – Exposure Control/Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels.

Exposure Limits:

<i>Chemical Name</i>	<i>ACGIH</i>	<i>NIOSH</i>	<i>OSHA</i>
Perchloric acid	None listed.	None listed.	None listed.
Water	None listed.	None listed.	None listed.

OSHA Vacated PELs

Personal Protective Equipment

Eyes: Wear appropriate protective face shield and eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin: Wear appropriate protective neoprene or polyethylene gloves to prevent skin exposure. Apron or clothing to protect skin. Rubber boots.

Clothing: Wear appropriate protective clothing to minimize contact with skin.

Respiratory Protection: Follow the OSHA respirator regulations found in 29CFR 1910.134. Always use a NIOSH-approved respirator when necessary. Less than ppm – chemical cartridge respirator. Guard against aspiration into lungs.

Ventilation: Adequate ventilation to maintain air below ppm. Use chemical fume hood.

Other Protective Equipment: Make eye bath and emergency shower available.

SECTION 9 – Physical and Chemical Properties

Physical State: Liquid

Appearance: Clear, colourless

Odour: Odourless, to slight chlorine smell

pH: Acidic

Vapour Pressure: 6.8 mm @ 25 °C

Vapour Density: 3.46

Evaporation Rate: No information available.

Viscosity: No information available.

Boiling Point: 72.4% (w/w): 203 °C (397.4 °F)

Freezing/Melting Point: 72.4% (w/w): -20 °C (-4 °F)

Decomposition Temperature: No information available.

Solubility: Soluble in water.

Specific Gravity/Density: 70% (w/w): 1.6736 g/mL @ 15 °C

Molecular Formula: HClO₄

Molecular Weight: 100.4576

SECTION 10 – Stability and Reactivity

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

Conditions to Avoid: Incompatible materials, excess heat, combustible materials, organic materials, reducing agents, temperatures above 200°C, alkaline materials, heating to decomposition, dehydrating agents.

Incompatibilities with Other Materials: Acetic acid, acetic anhydride, acetonitrile, acids, acetate, alcohols, alkyl ethers, alkyl sulfoxides, aniline and formaldehyde, aniline, antimony compounds (trivalent), azo-pigment and orthoperiodic acid, BIS (2-hydroxyethyl) terephthalate, bismuth, carbon, cellulose and derivatives, charcoal, combustible materials, copper dichromium tetraoxide, dehydrating agents, dichloromethane, diethyl ether, dibutyl sulfoxide, dimethyl sulfoxide, dioxane, ethylbenzene, fluorine, glycerine/glycerol and lead oxide, glycols and their ethers, graphitic carbon, hydriotic acid, hydrochloric acid, hydrofluoric acid, hydrogen, hydrogen halides, hypophosphites, iodides, iron(II) sulfate, ketones, metal oxides, methyl alcohol, 2-methylpropene, nitric acid, nitric/sulfuric acid with pyridine, nitrogen iodide, nitrosophenol, oleic acid, organic materials, paper, phenylacetylene, phosphine, phosphorus pentoxide, pyridine, sodium iodide, sodium phosphinate, steel, sulfinyl chloride, sulfoxides, sulfuric acid, sulfur trioxide, trichloroethylene, trimethylplatinum hydroxide, wood, zinc phosphide. May react violently or explosively with many of these compounds. Flammable, combustible, organic, dehydrating, oxidizing and reducing materials. Bases.

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.

Hazardous Decomposition Products: No information available for solutions ≤72%. Chlorine, hydrogen chloride, oxygen (concentrated acid).

Hazardous Polymerization: Has not been reported.

SECTION 11 – Toxicological Information

RTECS: CAS# 7601-90-3: SC7500000. CAS# 7732-18-5: ZC0110000.

LD50/LC50: CAS# 7601-90-3 Oral, rat: LD50 = 1100 mg/kg. CAS# 7732-18-5: ZC0110000. Oral, rat: LD50 = >90 mL/kg

Carcinogenicity: CAS# 7601-90-3: Not listed as a carcinogen by ACGIH, IARC, NIOSH, NTP, OSHA, or CA Prop 65. CAS# 7732-18-5: Not listed as a carcinogen by ACGIH, IARC, NIOSH, NTP, OSHA, or CA Prop 65.

Epidemiology: Not available.

Teratogenicity: Not available.

Reproductive: Not available.

Mutagenicity: Not available.

Neurotoxicity: No information available.

SECTION 12 – Ecological Information

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

Environmental: No information reported.

Physical: No information available

Other: No information available.

SECTION 13 – Disposal Considerations

Dispose of in a manner consistent with federal, provincial/territorial/state, and local regulations.

RCRA D-Maximum Concentration of Contaminants: None of the components are on this list.

RCRA D Series – Chronic Toxicity Reference Levels: None of the components are on this list.

RCRA F Series Wastes: None of the components are on this list.

RCRA P Series Wastes: None of the components are on this list.
 RCRA U Series Wastes: None of the components are on this list.
 RCRA Substances Banned from Land Disposal: None of the components are on this list.

SECTION 14 – Transport Information

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

NOTE: This information incorporates the Transportation of Dangerous Goods Regulations SOR/2001-286, effective October 14, 2009.

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

NOTE: This information was taken from the US Code of Federal Regulations Title 49 - Transportation and is effective July 1, 2009.

IATA (1 January – 31 December 2010)

UN/ID No.	Proper Shipping Name / Description	Class or Div. (Sub Risk)	Hazard Label(s)	PG	Passenger and Cargo Aircraft		Cargo Aircraft Only		S.P. See 4.4
					Pkg Inst	Max Net Qty/Pkg	Pkg Inst	Max/Net Qty/Pkg	
A	B	C	D	E	I	J	K	L	M
1873	Perchloric acid, 72% or less but more than 50% acid, by weight	5.1 (8)	Oxidizer & Corrosive	I	Forbidden		501	2.5 L	

NOTE: Consult IATA DG Regulations for the most recent information, abbreviations and reference marks.

SECTION 15 – Regulatory Information

US OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200)

OSHA Hazard Communication Evaluation: Meets criteria for hazardous material, as defined by 29 CFR 1910.1200.

US Federal

TSCA: CAS# 7601-90-3 is listed on the TSCA Inventory. CAS# 7732-18-5 is listed on the TSCA Inventory.

Health and Safety Reporting List: None of the components are on this list.

Chemical Test Rules: None of the components are on this list.

TSCA Section 12b: None of the components are on this list.

TSCA Significant New Use Rule (SNUR): None of the components are on this list.

CERCLA Reportable Quantities (RQ): None of the components are on this list.

SARA Threshold Planning Quantities (TPQ): None of the components are on this list.

SARA Hazard Categories: CAS# 7601-90-3: Acute, flammable.

SARA Section 313: None of the components are on this list.

US State

State Right to Know: Perchloric acid can be found on the following state Right-to-Know lists: New Jersey (RTK# 2637), Florida, Pennsylvania, Massachusetts (10 lbs RQ).

Clean Air Act – Hazardous Air Pollutants (HAPs): None of the components are on this list.

Clean Air Act – Class 1 Ozone Depletors: None of the components are on this list.

Clean Air Act – Class 2 Ozone Depletors: None of the components are on this list.

Clean Water Act – Hazardous Substances: None of the components are on this list.

Clean Water Act – Priority Pollutants: None of the components are on this list.

Clean Water Act – Toxic Pollutants: None of the components are on this list.

OSHA – Highly Hazardous: CAS# 7601-90-3 is considered highly hazardous by OSHA.

California Prop 65: No information available.

California No Significant Risk Level: No information available.

CANADIAN WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

CCOHS WHMIS Classification:

C - Oxidizing material

E - Corrosive material

WHMIS Health Effects Criteria Met by this Chemical: E - Corrosive to skin, E - TDG Class 8 - corrosive substance.

WHMIS Ingredient Disclosure List: Included for disclosure at 1% or greater.

Detailed WHMIS Classification According to Criteria:

Class A - Compressed Gas: Does not meet criteria.

Class B - Flammable and Combustible Material: Does not meet criteria. Not combustible (does not burn).

Class C - Oxidizing Material: Meets criteria. NFPA Class 1, 2 or 3 oxidizing material; TDG 5.1.

Class D - Poisonous and Infectious Material. Division 1 - Immediate and Serious Toxic Effects: Insufficient information for classification.

Acute Lethality: Insufficient information. LD50 (oral, dog): 400 mg/kg (unspecified concentration; unconfirmed)

Class D - Poisonous and Infectious Material. Division 2 - Other Toxic Effects: Insufficient information for classification. See detailed evaluation below.

Chronic Health Effects: Insufficient information.

Carcinogenicity: Does not meet criteria. Not included in standard reference lists.

Teratogenicity and Embryotoxicity: Insufficient information.

Reproductive Toxicity: Insufficient information.

Mutagenicity: Insufficient information.

Respiratory Tract Sensitization: Does not meet criteria.

Skin Irritation: Corrosive materials are not also classified as irritants.

Eye Irritation: Corrosive materials are not also classified as irritants.

Skin Sensitization: Does not meet criteria. Not reported as a skin sensitizer.

Class E - Corrosive Material: Meets criteria.

TDG class 8. Corrosive to skin. Corrodes aluminum alloy 3003 and carbon steel alloy 1020 at 21.1°C (70 °F). The corrosion rate at 55 °C (131 °F) is not known. No information on the corrosivity to aluminum alloy 7075-T6 was located.

Class F - Dangerously Reactive Material: Does not meet criteria.

Canadian DSL/NDSL: CAS# 7601-90-3 is listed on Canada's DSL/NDSL List. CAS# 7732-18-5 is listed on Canada's DSL/NDSL List.

EUROPEAN UNION (EU) CLASSIFICATION AND LABELLING INFORMATION

EU Index#: 017-006-00-4
EU Classification: Oxidizing liquid – Category 1
Skin corrosion – Category 1A
Corrosive to metals – Category 1

EU Signal Word: Danger

EU Pictograms:



EU Hazard Statements:

H271: May cause fire or explosion; strong oxidizer.

H314: Causes severe skin burns and eye damage.

EU 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/flame 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.

H290: May be corrosive to metals.

P321: Specific treatment (see P310).

P363: Wash contaminated clothing before reuse.

P370+P378: In case of fire: 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. 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.

Exposure Limits: CAS# 7601-90-3: OEL-CZECHOSLOVAKIA: TWA 1 mg/m³; STEL 2 mg/m³.

SECTION 16 – Other Information

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.