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

Product Identifier
Material Name
CHLORINE
Synonyms
MTG MSDS 22; CHLORINE MOLECULAR; DIATOMIC CHLORINE; DICHLORINE; MOLECULAR CHLORINE; UN 1017; Cl2
Chemical Family
halogens
Product Use
Industrial and Specialty Gas Applications.
Restrictions on Use
None known.
Supplier Information
MATHESON GAS PRODUCT KOREA
91-1 Samgeo-ri; Umbong-myun
Asan City, Korea
Phone: 041-539-7400 (day)
Emergency Phone #: 041-539-7488 (night/weekend/holiday)
Department in charge: SHE

SECTION 2: Hazards identification

Hazard/Risk Classification
Oxidizing Gases - Category 1
Gases Under Pressure - Liquefied gas
Acute Toxicity - Inhalation - Gas - Category 2
Skin Corrosion/Irritation - Category 1
Serious Eye Damage/Eye Irritation - Category 1
Specific Target Organ Toxicity - Single Exposure - Category 3
Specific Target Organ Toxicity - Repeated Exposure - Category 2 (kidneys, respiratory system, teeth)
Hazardous to the Aquatic Environment - Acute - Category 1
Hazardous to the Aquatic Environment - Chronic - Category 1
Safety Data Sheet

Material Name: CHLORINE

Label elements

Hazard symbols

Signal word

Danger

Hazard/Risk Statement

H270 May cause or intensify fire; oxidizer.
H280 Contains gas under pressure; may explode if heated.
H330 Fatal if inhaled.
H314 Causes severe skin burns and eye damage.
H335 May cause respiratory irritation.
H373 May cause damage to organs through prolonged or repeated exposure.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statements

Prevention

P220 Keep/Store away from clothing/combustible materials
P244 Keep valves and fittings free from oil and grease
P260 Do not breathe dust/fume/gas/mist/vapors/spray
P273 Avoid release to the environment
P280 Wear protective gloves/protective clothing/eye protection/face protection

Response

P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/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
P310 Immediately call a POISON CENTER or doctor
P320 Specific treatment is urgent (see label)
P391 Collect spillage
Safety Data Sheet

Material Name: CHLORINE

Storage
P403+P233 Store in a well-ventilated place. Keep container tightly closed

Disposal
None needed according to classification criteria.

Potential Environmental Effects
No information available for the product.

Other Hazards Which Do Not Result in Classification
May cause frostbite upon sudden release of liquefied gas.

### SECTION 3: Composition / information on ingredients

<table>
<thead>
<tr>
<th>CAS</th>
<th>Chemical name</th>
<th>Other Names</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>7782-50-5</td>
<td>CHLORINE</td>
<td>--</td>
<td>100</td>
</tr>
</tbody>
</table>

**Impurities and stabilizing additives contributing to the GHS Classification**
None

### SECTION 4: First aid measures

**Eye contact**
Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Then get immediate medical attention.

**Skin contact**
Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get immediate medical attention. Thoroughly clean and dry contaminated clothing before reuse.

**Inhalation**
If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

**Ingestion**
If swallowed, get medical attention.

**Most Important Symptoms/Effects**

**Symptoms: Immediate**
respiratory tract burns, skin burns, eye burns
Safety Data Sheet

Material Name: CHLORINE

Symptoms: Delayed
kidney damage, respiratory system effects, tooth erosion

**Indication of any immediate medical attention and special treatment needed**
For inhalation, consider oxygen.

### SECTION 5: Firefighting measures

**Suitable extinguishing media**
Water, Large fires: Flood with fine water spray.

**Unsuitable Extinguishing Media**
Do not use dry chemicals, carbon dioxide or halogenated extinguishing agents.

**Specific hazards arising from the chemical**
Oxidizer. May ignite or explode on contact with combustible materials. Containers may rupture or explode if exposed to heat.

**Protective Equipment and Precautions for Firefighters**
Wear full protective fire fighting gear including self contained breathing apparatus (SCBA) for protection against possible exposure.

**Fire Fighting Measures**
Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. For small fires, contain and let burn. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Evacuation radius: 800 meters (1/2 mile).

### SECTION 6: Accidental release measures

**Personal precautions, protective equipment and emergency procedures**
Wear personal protective clothing and equipment, see Section 8.

**Environmental precautions**
Avoid release to the environment. Keep out of water supplies and sewers.

**Methods for Containment**
Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so. Reduce vapors with water spray. Stop leak if safe to do so - Prevent entry into waterways,
drains, or confined areas. Do not touch spilled material. Eliminate all ignition sources if safe to do so. Keep unnecessary people away, isolate hazard area and deny entry.

Cleanup Methods
Ventilate closed spaces before entering. Damaged cylinders should be handled only by specialists.

SECTION 7: Handling and storage

Precautions for safe handling
Keep away from clothing and other combustible materials. Do not breathe gas. Do not eat, drink or smoke when using this product. Keep reduction valves free from grease and oil. Wear respiratory protection.

Wear suitable protective clothing, gloves and eye/face protection. Use only outdoors or in a well-ventilated area. Avoid release to the environment.

Conditions for safe storage, including any incompatibilities
Store in a well-ventilated place.
Store in a well-ventilated place. Keep container tightly closed.
Store locked up.
Protect from sunlight. Store in a well-ventilated place.

Store and handle in accordance with all current regulations and standards. Protect from physical damage.
Store outside or in a detached building. Store in a cool, dry place. Keep separated from incompatible substances.

Incompatible Materials
combustible materials, bases, metals, halogens, metal salts, reducing agents, amines, metal carbide, metal oxides, oxidizing materials, halo carbons, acids, arsenic, calcium, iodine, mercuric oxide, ethers, fluorine

SECTION 8: Exposure controls/personal protection

Exposure Guidelines

Component Exposure Limits

<table>
<thead>
<tr>
<th>CHLORINE</th>
<th>7782-50-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korea:</td>
<td>1 ppm STEL</td>
</tr>
</tbody>
</table>
ACGIH - Threshold Limit Values - Biological Exposure Indices (BEI)

There are no biological limit values for any of this product's components.

**Appropriate engineering controls**

Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

**PERSONAL PROTECTIVE EQUIPMENT**

**Eye/face protection**

Eye/face protection must be selected in accordance with Korea Occupational Safety and Health Agency certification. Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

**Skin and Body Protection**

Protective clothing must be selected in accordance with Korea Occupational Safety and Health Agency certification. Wear suitable protective clothing such as coveralls or long sleeve shirt and pants.

**Hand protection**

Gloves must be selected in accordance with Korea Occupational Safety and Health Agency certification. For the gas: Protective clothing is not required, but recommended. For the liquid: Wear chemical resistant, insulated gloves.

**Protective Materials**

If there is a possibility of direct contact or exposure to the substance, wear respiratory and eye protection and/or protective clothing, as applicable, which has received Korea Occupational Safety and Health Agency Certification.

**Respiratory Protection**

Respiratory protection must be selected in accordance with Korea Occupational Safety and Health Agency certification. Any powered, air-purifying respirator with cartridge(s) providing protection against this substance. Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted canister providing protection against the compound of concern.
### SECTION 9: Physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance</strong></td>
<td>yellow or green gas</td>
</tr>
<tr>
<td><strong>Physical State</strong></td>
<td>gas</td>
</tr>
<tr>
<td><strong>Physical Form</strong></td>
<td>gas</td>
</tr>
<tr>
<td><strong>Color</strong></td>
<td>yellow or green</td>
</tr>
<tr>
<td><strong>Odor</strong></td>
<td>distinct odor , irritating odor</td>
</tr>
<tr>
<td><strong>Odor Threshold</strong></td>
<td>0.01 ppm</td>
</tr>
<tr>
<td><strong>pH</strong></td>
<td>Not available</td>
</tr>
<tr>
<td><strong>Melting Point</strong></td>
<td>-101 °C (-150 °F )</td>
</tr>
<tr>
<td><strong>Freezing point</strong></td>
<td>Not available</td>
</tr>
<tr>
<td><strong>Boiling Point</strong></td>
<td>-35 °C (-31 °F )</td>
</tr>
<tr>
<td><strong>Boiling Point Range</strong></td>
<td>Not available</td>
</tr>
<tr>
<td><strong>Flash Point</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Evaporation Rate</strong></td>
<td>Not available</td>
</tr>
<tr>
<td><strong>Flammability (solid, gas)</strong></td>
<td>Not flammable</td>
</tr>
<tr>
<td><strong>Upper Explosive Limit</strong></td>
<td>Not available</td>
</tr>
<tr>
<td><strong>Lower Explosive Limit</strong></td>
<td>Not available</td>
</tr>
<tr>
<td><strong>Vapor Pressure</strong></td>
<td>5168 mmHg @ 21 °C</td>
</tr>
<tr>
<td><strong>Solubility (Other)</strong></td>
<td>Not available</td>
</tr>
</tbody>
</table>
Material Name: CHLORINE  
SDS ID: 00233315

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Solubility</td>
<td>1.46 % (@ 0 °C)</td>
</tr>
<tr>
<td>Vapor Density (air=1)</td>
<td>2.49</td>
</tr>
<tr>
<td>Specific Gravity (water=1)</td>
<td>1.5649 at -35 °C</td>
</tr>
<tr>
<td>Partition coefficient: n-octanol/water</td>
<td>Not available</td>
</tr>
<tr>
<td>Autoignition Temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Viscosity</td>
<td>0.01327 cp</td>
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<tr>
<td>Molecular Weight</td>
<td>70.906</td>
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<tr>
<td>Density</td>
<td>3.214 g/L at 0 °C</td>
</tr>
<tr>
<td>Molecular Formula</td>
<td>Cl2</td>
</tr>
</tbody>
</table>

Solvent Solubility
Soluble
alkali, chlorides, alcohols

SECTION 10: Stability and reactivity

Reactivity
May intensify fire; oxidizer.

Chemical stability
Stable at normal temperatures and pressure.

Possibility of Hazardous Reactions
Will not polymerize.

Conditions to avoid
Avoid contact with combustible materials. Minimize contact with material. Avoid inhalation of material or combustion by-products. Keep out of water supplies and sewers. May ignite or explode on contact with combustible materials.

Materials to Avoid (Incompatibilities)
combustible materials, bases, metals, halogens, metal salts, reducing agents, amines, metal carbide, metal oxides, oxidizing materials, halo carbons, acids, arsenic, calcium, iodine, mercuric oxide, ethers, fluorine

**Hazardous Decomposition Products**

Chlorine

**Water or Moisture**

hypochlorous acid, hydrochloric acid

### SECTION 11: Toxicological information

#### Information on Likely Routes of Exposure

**Inhalation**

burns, difficulty breathing, headache, dizziness, bluish skin color, lung damage, chest pain, hyperactivity, emotional disturbances, death, vomiting, lung congestion, lack of sense of smell, tooth decay

**Skin**

burns, frostbite

**Eye**

burns, frostbite

**Ingestion**

ingestion of a gas is unlikely

#### Health Hazards

**Acute and Chronic Toxicity**

**Component Analysis - LD50/LC50**

The components of this material have been reviewed in various sources and the following selected endpoints are published:

**CHLORINE (7782-50-5)**

Oral LD50 Rat 5800 mg/kg (females )

Inhalation LC50 Rat 293 ppm 1 h

**Acute Toxicity Estimate**

<table>
<thead>
<tr>
<th>Route</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation - Gas</td>
<td>146.5 ppm</td>
</tr>
<tr>
<td>Oral</td>
<td>&gt; 2000 mg/kg</td>
</tr>
</tbody>
</table>

**Immediate Effects**
respiratory tract burns, skin burns, eye burns

Delayed Effects
respiratory tract burns, skin burns, eye burns, kidney damage, tooth erosion, respiratory system effects

Skin corrosive/irritant
No data available.

Serious eye damage/irritation
No data available.

Respiratory Sensitization
No data available.

Dermal Sensitization
No data available.

Component Carcinogenicity

<table>
<thead>
<tr>
<th>Component</th>
<th>Carcinogenicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHLORINE</td>
<td>7782-50-5</td>
</tr>
<tr>
<td>ACGIH</td>
<td>A4 - Not Classifiable as a Human Carcinogen</td>
</tr>
</tbody>
</table>

Mutagenic Data
No data available.

Reproductive Effects Data
No data available.

Specific Target Organ Toxicity - Single Exposure
respiratory tract

Specific Target Organ Toxicity - Repeated Exposure
kidneys, teeth, respiratory system respiratory tract.

Aspiration hazard
Not applicable.

Medical Conditions Aggravated by Exposure
heart problems

SECTION 12: Ecological information

Ecotoxicity
Very toxic to aquatic life with long lasting effects.

Component Analysis - Aquatic Toxicity
**Abiotic degradation**
Rapidly undergoes disproportionation in water to form hypochlorous acid and chloride ion.

**Persistence and degradability**
No information available for the product.

**Bioaccumulative Potential**
No information available for the product.

**Mobility in soil**
No information available for the product.

**Other adverse effects**
No additional information available.

### SECTION 13: Disposal considerations

**Disposal Methods**
Dispose of contents/container in accordance with the regulations outlined in the Waste Management Act.

**Disposal Precaution**
Empty containers may contain product residue. Dispose of contents/container in accordance with the regulations outlined in the Waste Management Act.

### SECTION 14: Transport information

**IATA Information:**
**UN#:** UN1017
**Shipping Name:** CHLORINE
**Hazard Class:** 2.3
**Required Label(s):** 2.3, 5.1, 8
**Packing Group:** Not applicable
Material Name: CHLORINE

Forbidden by Air
Further information: Default
Marine pollutant: Marine pollutant

ICAO Information:
UN#: UN1017
Shipping Name: CHLORINE
Hazard Class: 2.3
Required Label(s): 2.3, 5.1, 8
Packing Group: Not applicable
Forbidden by Air
Further information: Default
Marine pollutant: Marine pollutant

IMDG Information:
UN#: UN1017
Shipping Name: CHLORINE
Hazard Class: 2.3
Required Label(s): 2.3, 5.1, 8, P
Packing Group: Not applicable
Further information: Default
Marine pollutant: Marine pollutant

International Bulk Chemical Code
This material does not contain any chemicals required by the IBC Code to be identified as dangerous chemicals in bulk.

Special precautions
No additional information available for the product.

SECTION 15: Regulatory information

Korea Regulations
Industrial Safety and Health Act

| CHLORINE       | 7782-50-5 |
Material Name: CHLORINE

### Hazardous Substances Subject to Control:

<table>
<thead>
<tr>
<th>Gas Phase Substances:</th>
<th>&gt;=1 % mixture Serial No. 007</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Harmful Agents Subject to Work Environment Monitoring (Measurement Cycle: 6 months):</strong></td>
<td></td>
</tr>
<tr>
<td>Gas Phase Substances:</td>
<td>&gt;=1 % mixture (Measurement cycle: 6 months )</td>
</tr>
<tr>
<td><strong>Harmful Agents Subject to Workers Requiring Health Examination (Diagnostic cycle : 12 Months):</strong></td>
<td></td>
</tr>
<tr>
<td>Gas Phase Substances:</td>
<td>&gt;=1 % mixture (Diagnostic cycle: 12 months ) Serial No. 006</td>
</tr>
<tr>
<td><strong>Matters subject to Submission of Process Safety Reports (PSM):</strong></td>
<td></td>
</tr>
<tr>
<td>Substance subject to Process Safety Report Submission</td>
<td></td>
</tr>
</tbody>
</table>

### Manufacturing or Handling

- Yes

### Storage

- Yes

### Occupational exposure limit values:

<table>
<thead>
<tr>
<th>TWA.</th>
<th>0.5 ppm TWA Serial No. 420</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEL</td>
<td>1 ppm STEL Serial No. 420</td>
</tr>
</tbody>
</table>

### Permissible Exposure Limits:

<table>
<thead>
<tr>
<th>TWA.</th>
<th>0.5 ppm TWA</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEL</td>
<td>1 ppm STEL</td>
</tr>
</tbody>
</table>

### Chemicals Control Act (CCA)

The following component(s) of this material are listed:
### Accident Precaution Chemicals:

- **CHLORINE**: 25%

### Dangerous Materials Safety Control Act

This product is not regulated under the Dangerous Materials Safety Control Act.

### Product Classification

Not applicable

### Waste Management Act

Not applicable

### Other requirements in domestic and other countries

No data available.

### Component Analysis - Inventory

#### CHLORINE (7782-50-5)

<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>DSL</td>
<td>Yes</td>
<td>Yes</td>
<td>EIN</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>KR - REACH CCA</th>
<th>MX</th>
<th>NZ</th>
<th>PH</th>
<th>TH-TECI</th>
<th>TW, CN</th>
<th>VN (Draft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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</tbody>
</table>

### Information sources and references

Available upon request.

### Preparation Date

Reformat: 18 July 2016

### Revision date

Issue Date: 18 July 2016
Safety Data Sheet

Material Name: CHLORINE

ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CA/MA/MN/NJ/PA - California/Massachusetts/Minnesota/New Jersey/Pennsylvania*; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CFR - Code of Federal Regulations (US); CLP - Classification, Labelling, and Packaging; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSD - Dangerous Substance Directive; DSL - Domestic Substances List; EC – European Commission; EEC - European Economic Community; EIN - European Inventory of (Existing Commercial Chemical Substances); EINECS - European Inventory of Existing Commercial Chemical Substances; ENCS - Japan Existing and New Chemical Substance Inventory; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; F - Background (for Venezuela Biological Exposure Indices); IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; ISHL - Japan Industrial Safety and Health Law; IUCLID - International Uniform Chemical Information Database; JP - Japan; Kow - Octanol/water partition coefficient; KR KECI Annex 1 - Korea Existing Chemicals Inventory (KECI) / Korea Existing Chemicals List (KECL); KR KECI Annex 2 - Korea Existing Chemicals Inventory (KECI) / Korea Existing Chemicals List (KECL); LD50/LC50 - Lethal Dose/ Lethal Concentration; KR REACH CCA - Korea Registration and Evaluation of Chemical Substances Chemical Control Act; LEL - Lower Explosive Limit; LLV - Level Limit Value; LOLI - List Of Lists™ - ChemADVISOR’s Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; MX - Mexico; Ne- Non-specific; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; Nq - Non-quantitative; NSL - Non-Domestic Substance List (Canada); NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PEL - Permissible Exposure Limit; PH - Philippines; RCRA - Resource Conservation and Recovery Act; REACH- Registration, Evaluation, Authorisation, and restriction of Chemicals; RID - European Rail Transport; SARA - Superfund Amendments and Reauthorization Act; Sc - Semi-quantitative; STEL - Short-term Exposure Limit; TCCA – Korea Toxic Chemicals Control Act; TDG - Transportation of Dangerous Goods; TH-TECI - Thailand - FDA Existing Chemicals Inventory (TECI); TLV - Threshold Limit Value; TSCA - Toxic Substances Control Act; TW – Taiwan; TWA - Time Weighted Average; UEL - Upper Explosive Limit; UN/NA - United Nations /North
Safety Data Sheet

Material Name: CHLORINE

American; US - United States; VLE - Exposure Limit Value (Mexico); VN (Draft) - Vietnam (Draft); WHMIS - Workplace Hazardous Materials Information System (Canada).

Other Information

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