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

1.1 Product identifiers

Product name : Chlorine
Product Number : 295132
Brand : Aldrich
Index-No. : 017-001-00-7
CAS-No. : 7782-50-5

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

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Oxidizing gases (Category 1), H270
Gases under pressure (Compressed gas), H280
Acute toxicity, Inhalation (Category 1), H330
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements
Pictogram

Signal word  Danger

Hazard statement(s)
H270  May cause or intensify fire; oxidizer.
H280  Contains gas under pressure; may explode if heated.
H315  Causes skin irritation.
H319  Causes serious eye irritation.
H330  Fatal if inhaled.
H335  May cause respiratory irritation.
H410  Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P220  Keep/Store away from clothing/ combustible materials.
P244  Keep reduction valves free from oil and grease.
P260  Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
P264  Wash skin thoroughly after handling.
P271  Use only outdoors or in a well-ventilated area.
P273  Avoid release to the environment.
P280  Wear protective gloves/ eye protection/ face protection.
P284  Wear respiratory protection.
P302 + P352  IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P310  IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
P305 + P351 + P338  IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P332 + P313  If skin irritation occurs: Get medical advice/ attention.
P337 + P313  If eye irritation persists: Get medical advice/ attention.
P362  Take off contaminated clothing and wash before reuse.
P370 + P376  In case of fire: Stop leak if safe to do so.
P391  Collect spillage.
P403 + P233  Store in a well-ventilated place. Keep container tightly closed.
P405  Store locked up.
P410 + P403  Protect from sunlight. Store in a well-ventilated place.
P501  Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS
Contact with liquid or refrigerated gas can cause cold burns and frostbite.

SECTION 3: Composition/information on ingredients

3.1 Substances

| Formula | Cl₂ |
| Molecular weight | 70.91 g/mol |
| CAS-No. | 7782-50-5 |
| EC-No. | 231-959-5 |
| Index-No. | 017-001-00-7 |

Component | Classification | Concentration

Aldrich - 295132
**SECTION 4: First aid measures**

4.1 **Description of first-aid measures**

**General advice**
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

**If inhaled**
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

**In case of skin contact**
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/shower.

**In case of eye contact**
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

**If swallowed**
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 **Most important symptoms and effects, both acute and delayed**
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 **Indication of any immediate medical attention and special treatment needed**
No data available

**SECTION 5: Firefighting measures**

5.1 **Extinguishing media**

**Suitable extinguishing media**
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

**Unsuitable extinguishing media**
For this substance/mixture no limitations of extinguishing agents are given.
5.2 Special hazards arising from the substance or mixture
Hydrogen chloride gas
Not combustible.
Has a fire-promoting effect due to release of oxygen.
Ambient fire may liberate hazardous vapours.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Do not breathe gas. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert. For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Stop flow of gas, move leaking cylinder to open air if without risk.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Storage conditions
Tightly closed. Keep locked up or in an area accessible only to qualified or authorized persons. Keep away from combustible materials and sources of ignition.

Contents under pressure.
Storage class (TRGS 510): 2A: Gases

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dichlorine</td>
<td>7782-50-5</td>
<td>TWA 0.1 ppm</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>STEL 0.4 ppm</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Not classifiable as a human carcinogen</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>0.5 ppm 1.45 mg/m3</td>
<td>USA. NIOSH Recommended Exposure Limits</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>1 ppm 3 mg/m3</td>
<td>USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</td>
<td></td>
</tr>
<tr>
<td>PEL</td>
<td></td>
<td>0.5 ppm 1.5 mg/m3</td>
<td>California permissible exposure limits for chemical contaminants (Title 8, Article 107)</td>
<td></td>
</tr>
<tr>
<td>STEL</td>
<td></td>
<td>1 ppm 3 mg/m3</td>
<td>California permissible exposure limits for chemical contaminants (Title 8, Article 107)</td>
<td></td>
</tr>
</tbody>
</table>

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Full contact
Material: Viton®
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact  
Material: Viton®  
Minimum layer thickness: 0.7 mm  
Break through time: 480 min  
Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

**Body Protection**
Protective clothing

**Respiratory protection**
Required when vapours/aerosols are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

**Control of environmental exposure**
Do not let product enter drains.

---

### SECTION 9: Physical and chemical properties

#### 9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
</table>
| **a)** Appearance | Form: Compressed gas  
Color: yellow |
| **b)** Odor | Pungent |
| **c)** Odor Threshold | No data available |
| **d)** pH | 1.8 at 6.4 g/l at 20 °C (68 °F) |
| **e)** Melting point/freezing point | Melting point/range: -101 °C (-150 °F) - lit. |
| **f)** Initial boiling point and boiling range | -34 °C -29 °F - lit. |
| **g)** Flash point | ( ) Not applicable |
| **h)** Evaporation rate | No data available |
| **i)** Flammability (solid, gas) | No data available |
| **j)** Upper/lower flammability or explosive limits | No data available |
| **k)** Vapor pressure | 6,399 hPa at 20 °C (68 °F) |
| **l)** Vapor density | 2.44 - (Air = 1.0) |
| **m)** Relative density | No data available |
| **n)** Water solubility | 7.41 g/l at 20 °C (68 °F) - soluble |
| **o)** Partition coefficient: n-octanol/water | Not applicable for inorganic substances |
| **p)** Autoignition temperature | No data available |
| **q)** Decomposition temperature | No data available |
| **r)** Viscosity | No data available |
9.2 Other safety information

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface tension</td>
<td>82.4 mN/m at 20 °C (68 °F)</td>
<td>OECD Test Guideline 115</td>
</tr>
<tr>
<td>Dissociation constant</td>
<td>7 at 20 °C (68 °F)</td>
<td></td>
</tr>
<tr>
<td>Relative vapor density</td>
<td>2.44 - (Air = 1.0)</td>
<td></td>
</tr>
</tbody>
</table>

**SECTION 10: Stability and reactivity**

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature).

10.3 Possibility of hazardous reactions
Risk of ignition or formation of inflammable gases or vapours with:
- Copper
Risk of explosion with:
- Hydrogen
- Acetylene
- Ammonia
- Metals
- Aluminum
- Tin
- Mild steel
- Iron
- Phosphorus
Violent reactions possible with:
- Numerous inorganic and/or organic compounds
- Water
- Oxygen
- Acids

10.4 Conditions to avoid
No information available

10.5 Incompatible materials
Bronze

10.6 Hazardous decomposition products
In the event of fire: see section 5

**SECTION 11: Toxicological information**

11.1 Information on toxicological effects

**Acute toxicity**
Oral: No data available
LC50 Inhalation - Rat - male and female - 4 h - 0.2 mg/l  
(OECD Test Guideline 403)  
Inhalation: Irritating to respiratory system.  
Symptoms: damage of respiratory tract, Cough, Shortness of breath  
LD50 Dermal - Rabbit - male and female - > 20,000 mg/kg  
(OECD Test Guideline 402)  
The value is given in analogy to the following substances: sodium hypochlorite solution

**Skin corrosion/irritation**  
Skin - Rabbit  
Result: Irritating to skin. - 4 h  
(OECD Test Guideline 404)  
Remarks: (in analogy to similar products)  
The value is given in analogy to the following substances: sodium hypochlorite solution  
Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

**Serious eye damage/eye irritation**  
Causes serious eye irritation. Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

**Respiratory or skin sensitization**  
Buehler Test - Guinea pig  
Result: negative  
(OECD Test Guideline 406)  
Remarks: (in analogy to similar products)  
The value is given in analogy to the following substances: sodium hypochlorite solution

**Germ cell mutagenicity**  
No data available

**Carcinogenicity**  
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

**Reproductive toxicity**  
No data available

**Specific target organ toxicity - single exposure**  
Inhalation - May cause respiratory irritation. - Respiratory Tract  
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

**Specific target organ toxicity - repeated exposure**  
No data available

**Aspiration hazard**  
No data available

11.2 **Additional Information**  
Repeated dose toxicity - Rat - male - Oral - 90 Days - NOAEL (No observed adverse effect level) - >= 16.7 mg/kg - LOAEL (Lowest observed adverse effect level) - > 16.7 mg/kg  
Remarks: (in analogy to similar products)  
The value is given in analogy to the following substances: sodium hypochlorite solution
RTECS: FO2100000
Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., Cough, Shortness of breath, Headache, Nausea
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
Possible damages:
in case of perspiration/moisture corrosive.

After long-term exposure to the chemical:

Cyanosis
Lung edema
Vomiting
Circulatory collapse

The substance has delayed effects.
In high concentrations:
respiratory arrest

Handle in accordance with good industrial hygiene and safety practice.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish
flow-through test LC50 - Leiostomus xanthurus - 0.09 mg/l - 96 h
Remarks: (in analogy to similar products)
(ECHA)

Toxicity to daphnia and other aquatic invertebrates
flow-through test EC50 - Ceriodaphnia dubia (water flea) - 0.035 mg/l - 48 h
(OECD Test Guideline 202)

Toxicity to algae
flow-through test NOEC - algae - 0.002 mg/l - 7 Days
Remarks: (in analogy to similar products)
(ECHA)
The value is given in analogy to the following substances: sodium hypochlorite solution

Toxicity to bacteria
static test EC50 - activated sludge - 563 mg/l - 3 h
(OECD Test Guideline 209)
Remarks: (in analogy to similar products)
The value is given in analogy to the following substances: sodium hypochlorite solution

12.2 Persistence and degradability
The methods for determining biodegradability are not applicable to inorganic substances.

Aldrich - 295132
Theoretical oxygen demand 0 - 230 mg/g
Remarks: (calculated)(IUCLID)

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
Biological effects:
Forms toxic mixtures in water, dilution measures notwithstanding. Discharge into the environment must be avoided.

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. Pressurised gas bottle: dispose of only in empty condition! See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
UN number: 1017  Class: 2.3 (5.1, 8)
Proper shipping name: Chlorine
Reportable Quantity (RQ): 10 lbs
Poison Inhalation Hazard: Hazard Zone B

IMDG
UN number: 1017  Class: 2.3 (5.1, 8)
Proper shipping name: CHLORINE
Marine pollutant : yes

IATA
UN number: 1017  Class: 2.3 (5.1, 8)
Proper shipping name: Chlorine
IATA Passenger: Not permitted for transport
IATA Cargo: Not permitted for transport

EMS-No: F-C, S-U

SECTION 15: Regulatory information

SARA 302 Components

Aldrich - 295132
**SARA 313 Components**
The following components are subject to reporting levels established by SARA Title III, Section 313:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dichlorine</td>
<td>7782-50-5</td>
<td>2013-02-08</td>
</tr>
</tbody>
</table>

**SARA 311/312 Hazards**
Sudden Release of Pressure Hazard, Reactivity Hazard, Acute Health Hazard

**Massachusetts Right To Know Components**
No components are subject to the Massachusetts Right to Know Act.

**SECTION 16: Other information**

**Further information**
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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