1. Identification

Product identifier CHLORINE
Other means of identification Not available.
Recommended use Chlorinating and oxidizing agent, Water treatment chemicals, pharmaceutical, Synthesis, Disinfectants and general biocidal products, Plastics
Recommended restrictions None known.

Manufacturer / Importer / Supplier / Distributor information

Company name Olin Chlor Alkali Products
Address 490 Stuart Road, NE
Cleveland, TN 37312

Company name Pioneer Americas, LLC (d/b/a Olin Chlor Alkali Products)
Address 490 Stuart Road, NE
Cleveland, TN 37312

Company name Olin Canada ULC (d/b/a Olin Chlor Alkali Products)
Address 2020 University, Suite 2190
Montreal, Quebec H3A 2A5

General Information
Telephone (888) 658-MSDS (6737)
Website olinchloralkali.com
Contact person ORC MSDS Control Group
Emergency phone number CHEMTREC
US: 1-800-424-9300 Canada: 1-800-567-7455

2. Hazard(s) identification

Physical hazards Oxidizing gases Category 1
Gases under pressure Liquefied gas

Health hazards Acute toxicity, inhalation Category 2
Skin corrosion/irritation Category 1
Serious eye damage/eye irritation Category 1
Specific target organ toxicity, single exposure Category 3 respiratory tract irritation
Specific target organ toxicity, repeated exposure Category 1 (Lung)

OSHA defined hazards Not classified.

Label elements

Signal word Danger
Hazard statement May cause or intensify fire; oxidizer. Contains gas under pressure; may explode if heated. Causes severe skin burns and eye damage. Fatal if inhaled. May cause respiratory irritation. Causes damage to organs (lung) through prolonged or repeated exposure.

Precautionary statement

Prevention Keep/Store away from clothing//combustible materials. Keep reduction valves/valves and fittings free from oil and grease. Do not breathe gas. Use only outdoors or in a well-ventilated area. Do not eat, drink or smoke when using this product. Wear protective gloves/protective clothing/eye protection/face protection. Wear respiratory protection. Wash thoroughly after handling.

Response In case of fire: Stop leak if safe to do so. Get medical advice/attention if you feel unwell. If inhaled: Remove person to fresh air and keep comfortable for breathing. If swallowed: Rinse mouth. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center/doctor. Specific treatment is urgent. Wash contaminated clothing before re-use.

Storage Store in a well-ventilated place. Keep container tightly closed. Store locked up.
Disposal Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC) Not classified.

Environmental hazards Hazardous to the aquatic environment, acute Category 1 hazard

Supplemental information

Hazard symbol

Hazard statement Very toxic to aquatic life.

Precautionary statement

Prevention Avoid release to the environment.

Response Collect spillage.

3. Composition/information on ingredients

<table>
<thead>
<tr>
<th>Substances</th>
<th>Chemical name</th>
<th>Common name and synonyms</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHLORINE</td>
<td></td>
<td></td>
<td>7782-50-5</td>
<td>98-100</td>
</tr>
</tbody>
</table>

4. First-aid measures

Inhalation Move to fresh air. If breathing is difficult, give oxygen. If breathing stops, provide artificial respiration. Get medical attention immediately!

Skin contact Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately! Chemical burns must be treated by a physician. Wash contaminated clothing before reuse.

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. Get medical attention immediately.

Ingestion Ingestion is not a typical route of exposure for gases or liquefied gases. Contact with liquid form may cause frostbite. Immediately call a poison control center or doctor for treatment advice.

Most important symptoms/effects, acute and delayed Contact with this material will cause burns to the skin, eyes and mucous membranes. Unconsciousness. Cough, shortness of breath, headache, nausea, vomiting. May cause lung damage.

Indication of immediate medical attention and special treatment needed For liquid contact, treat the affected person for frostbite if necessary. If the product is ingested, probable mucosal damage may contraindicate the use of gastric lavage. Treat the affected person appropriately. Provide general supportive measures and treat symptomatically. Symptoms may be delayed.

General information Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media Use fire-extinguishing media appropriate for surrounding materials.

Unsuitable extinguishing media Direct water spray. Direct water spray jet.

Specific hazards arising from the chemical May cause fire or explosion; strong oxidizer. Contents under pressure. Pressurized container may explode when exposed to heat or flame. Contact with reactive metals e.g., aluminum, zinc and tin may result in the generation of flammable hydrogen gas. Water used for fire extinguishing, which has been in contact with the product, may be corrosive. Water spray on active leak may promote accelerated corrosion of container and accelerate rate of leakage.

Special protective equipment and precautions for firefighters Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask. Additional protective clothing must be worn to prevent personal contact with this material. Those items include but are not limited to: boots, gloves, hard hat, splash-proof goggles, full face shield and impervious clothing, i.e. chemically impermeable suit. Compatible materials for response to this material are neoprene and butyl rubber.

Fire-fighting equipment/instructions In case of fire and/or explosion do not breathe fumes. Remove pressurized gas cylinders from the immediate vicinity. Cylinders can burst violently when heated, due to excess pressure build-up. Cool containers / tanks with water spray. Evacuate area and fight fire remotely due to the risk of explosion.
6. Accidental release measures

**Personal precautions, protective equipment and emergency procedures**

Immediately evacuate personnel to safe areas. Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks). Keep people away from and upwind of spill/leak. Keep out of low areas. Keep unnecessary personnel away. Ventilate closed spaces before entering them. Wear appropriate protective equipment and clothing during clean-up. Local authorities should be advised if significant spillages cannot be contained.

For response to Chlorine gas it is recommended to use as a minimum level "B" protection that is compatible to Chlorine. For liquid spills it is recommended to utilize as a minimum enhanced level "B" (Enhanced Level "B" is the addition of a splash hood). Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Responders can reference Chlorine Institute pamphlet #65 on PPE.

**Methods and materials for containment and cleaning up**

Extinguish all flames in the vicinity. Keep combustibles (wood, paper, oil, etc.) away from spilled material. Ventilate well, stop flow of gas or liquid if possible. If possible, turn leaking containers so that gas escapes rather than liquid. Dike far ahead of spill for later disposal. Isolate area until gas has dispersed. Neutralize spilled material with crushed limestone, soda ash or lime. Collect spillage.

Never return spills to original containers for re-use. Clean up in accordance with all applicable regulations. For waste disposal, see section 13 of the MSDS.

**Environmental precautions**

Avoid discharge into drains, water courses or onto the ground. Contact local authorities in case of spillage to drain/aquatic environment.

7. Handling and storage

**Precautions for safe handling**

Avoid heat, sparks, open flames and other ignition sources. Keep away from clothing and other combustible materials. Use only chlorine-compatible lubricants. Do not use greases and oils. Do not breathe gas. Do not get in eyes, on skin, on clothing. Use in a sealed system and/or a well-ventilated area. Wear appropriate personal protective equipment. Observe good industrial hygiene practices. Avoid release to the environment.

**Conditions for safe storage, including any incompatibilities**

Contents under pressure. Keep away from heat, sparks and open flame. Secure cylinders in an upright position at all times, close all valves when not in use. Store in a well-ventilated place. Store away from incompatible materials.

Store at temperatures not exceeding 55°C/131°F. For the above specified temperature the system pressure is 225 psig (1551kPa).

8. Exposure controls/personal protection

**Occupational exposure limits**

**US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)**

<table>
<thead>
<tr>
<th>Material</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHLORINE (CAS 7782-50-5)</td>
<td>Ceiling</td>
<td>3 mg/m3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 ppm</td>
</tr>
</tbody>
</table>

**US. ACGIH Threshold Limit Values**

<table>
<thead>
<tr>
<th>Material</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHLORINE (CAS 7782-50-5)</td>
<td>STEL</td>
<td>1 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.5 ppm</td>
</tr>
</tbody>
</table>

**Biological limit values**

No biological exposure limits noted for the ingredient(s).

**Exposure guidelines**

Check State and local regulations for other applicable exposure limits.

**Appropriate engineering controls**

Should be handled in closed systems, if possible. Provide adequate ventilation. Observe Occupational Exposure Limits and minimize the risk of inhalation. Eye wash facilities and emergency shower must be available when handling this product.

**Individual protection measures, such as personal protective equipment**

- **Eye/face protection**
  Wear goggles/face shield. Gas-proof goggles are recommended.

- **Skin protection**
  - **Hand protection**
    Wear cold insulating gloves. Suitable gloves can be recommended by the glove supplier.
  - **Other**
    Wear appropriate chemical resistant clothing.

- **Respiratory protection**
  If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn.

- **Thermal hazards**
  Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations
Do not eat, drink or smoke when using the product. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance
Compressed liquefied gas.

Physical state
Gas Compressed, liquified.

Form
Liquefied gas.

Color
Yellow green.

Odor
Pungent.

Odor threshold
1.7 ppm

pH
Not available.

Melting point/freezing point
-149.8 °F (-101 °C) (1 atm)

Initial boiling point and boiling range
-29.27 °F (-34.04 °C) (1 atm)

Flash point
Not applicable.

Evaporation rate
Not available.

Flammability (solid, gas)
Not available.

Upper/lower flammability or explosive limits

Flammability limit - lower (%)
Not applicable.

Flammability limit - lower temperature
Not applicable.

Flammability limit - upper (%)
Not applicable.

Flammability limit - upper temperature
Not applicable.

Explosive limit - lower (%)
Not available.

Explosive limit - upper (%)
Not available.

Vapor pressure
113 psia (25°C/77°F)
779 kPa (25 °C/77 °F)
4800 mm Hg (25°C/77°F)

Vapor density
2.5

Relative density
Not available.

Solubility(ies)
0.73 g/100g H2O (20°C/68°F) (760 mm Hg)

Partition coefficient (n-octanol/water)
Not available.

Auto-ignition temperature
Not available.

Decomposition temperature
Not available.

Viscosity
Not available.

Other information
Bulk density
88.76 lb/ft³ 59.8 °F (15.6 °C)

Density
0.76 lb/ft³ 32 °F (0 °C) 53.51 psia

Heat of vaporization
123.9 BTU/lb

Molecular formula
Cl₂

Molecular weight
70.906 g/mol

10. Stability and reactivity

Reactivity
Contact with combustible material may cause fire.

Chemical stability
Stable under normal temperature conditions and recommended use.

Possibility of hazardous reactions
Hazardous polymerization does not occur.
Conditions to avoid
Avoid heat, sparks, open flames and other ignition sources. Titanium will react vigorously, resulting in spontaneous ignition, when contacted by Dry Chlorine. Combustion will be supported in carbon steel systems and equipment containing a Chlorine environment at temperatures greater than 480 °F (248.9 °C). Properly purge systems and equipment PRIOR to conducting Hot Work.

Incompatible materials

Hazardous decomposition products
Hydrogen chloride. Hypochlorous acid.

11. Toxicological information

Information on likely routes of exposure

Ingestion
Causes digestive tract burns.

Inhalation
Fatal if inhaled. Irritating to respiratory system.

Skin contact
Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

Eye contact
Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling. Can cause blurred vision, redness, pain, severe tissue burns and eye damage.

Symptoms related to the physical, chemical and toxicological characteristics
Contact with this material will cause burns to the skin, eyes and mucous membranes. Cough, shortness of breath, headache, nausea, vomiting. May cause lung damage. Unconsciousness.

Information on toxicological effects

Acute toxicity
Fatal if inhaled.
Irritation Threshold: approximately 0.5 ppm
Immediately Dangerous to Life or Health: 10.0 ppm.

<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHLORINE (CAS 7782-50-5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inhalation</td>
<td>Rat</td>
<td>293 ppm, 1 hr</td>
</tr>
<tr>
<td>Skin corrosion/irritation</td>
<td>Causes severe skin burns.</td>
<td></td>
</tr>
<tr>
<td>Serious eye damage/eye irritation</td>
<td>Causes serious eye damage.</td>
<td></td>
</tr>
<tr>
<td>Respiratory sensitization</td>
<td>No data available.</td>
<td></td>
</tr>
<tr>
<td>Skin sensitization</td>
<td>No data available.</td>
<td></td>
</tr>
<tr>
<td>Germ cell mutagenicity</td>
<td>No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.</td>
<td></td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.</td>
<td></td>
</tr>
<tr>
<td>Reproductive toxicity</td>
<td>No data available.</td>
<td></td>
</tr>
<tr>
<td>Specific target organ toxicity - single exposure</td>
<td>Not available.</td>
<td></td>
</tr>
<tr>
<td>Specific target organ toxicity - repeated exposure</td>
<td>Causes damage to organs (lungs) through prolonged or repeated exposure.</td>
<td></td>
</tr>
<tr>
<td>Aspiration hazard</td>
<td>Due to the physical form of the product it is not an aspiration hazard.</td>
<td></td>
</tr>
<tr>
<td>Chronic effects</td>
<td>Prolonged exposure may cause chronic effects.</td>
<td></td>
</tr>
<tr>
<td>Further information</td>
<td>Be aware that symptoms of lung edema (shortness of breath) may develop up to 24 hours after exposure.</td>
<td></td>
</tr>
</tbody>
</table>

12. Ecological information

Ecotoxicity
Very toxic to aquatic life with long lasting effects.

<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHLORINE (CAS 7782-50-5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquatic</td>
<td>Pacific oyster (Crassostrea gigas)</td>
<td>637.5 mg/l, 1 hours</td>
</tr>
<tr>
<td></td>
<td>Water flea (Daphnia magna)</td>
<td>0.017 mg/l, 46 hours</td>
</tr>
<tr>
<td></td>
<td>Bluegill (Lepomis macrochirus)</td>
<td>0.44 mg/l, 96 hours</td>
</tr>
<tr>
<td></td>
<td>Bullhead, catfish (Ictalurus sp.)</td>
<td>0.07 mg/l, 96 hours</td>
</tr>
<tr>
<td></td>
<td>Yellow perch (Perca flavescens)</td>
<td>0.88 mg/l, 1 hours</td>
</tr>
</tbody>
</table>

Persistence and degradability
No data available.

Bioaccumulative potential
Will not bio-accumulate.
Mobility in soil

The Gas will disperse in the air. This product is miscible in water.

Other adverse effects

No data available.

13. Disposal considerations

Disposal instructions

Return the empty cylinder to the supplier. Disposal recommendations are based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

Local disposal regulations

Dispose in accordance with all applicable regulations.

Hazardous waste code

D002: Waste Corrosive material [pH <=2 or =>12.5, or corrosive to steel]

Waste from residues / unused products

Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions). Avoid discharge into water courses or onto the ground.

Contaminated packaging

Since emptied cylinders may retain product residue, follow label warnings even after cylinder is emptied.

14. Transport information

DOT

<table>
<thead>
<tr>
<th>UN number</th>
<th>UN1017</th>
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<tbody>
<tr>
<td>UN proper shipping name</td>
<td>Chlorine</td>
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<tr>
<td>Transport hazard class(es)</td>
<td>2.3</td>
</tr>
<tr>
<td>Subsidiary class(es)</td>
<td>5.1, 8</td>
</tr>
<tr>
<td>Packing group</td>
<td>Not available.</td>
</tr>
<tr>
<td>Environmental hazards</td>
<td>Yes</td>
</tr>
<tr>
<td>Special precautions for user</td>
<td>Read safety instructions, SDS and emergency procedures before handling.</td>
</tr>
<tr>
<td>Special provisions</td>
<td>2, B9, B14, N86, T50, TP19</td>
</tr>
<tr>
<td>Packaging exceptions</td>
<td>None</td>
</tr>
<tr>
<td>Packaging non bulk</td>
<td>304</td>
</tr>
<tr>
<td>Packaging bulk</td>
<td>314, 315</td>
</tr>
</tbody>
</table>

IATA

<table>
<thead>
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<th>UN number</th>
<th>UN1017</th>
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<tbody>
<tr>
<td>UN proper shipping name</td>
<td>Chlorine</td>
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<td>Transport hazard class(es)</td>
<td>2.3</td>
</tr>
<tr>
<td>Subsidiary class(es)</td>
<td>5.1, 8</td>
</tr>
<tr>
<td>Packaging group</td>
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<tr>
<td>Environmental hazards</td>
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</tr>
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<td>Labels required</td>
<td>Not available.</td>
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<tr>
<td>ERG Code</td>
<td>2CP</td>
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<tr>
<td>Special precautions for user</td>
<td>Read safety instructions, SDS and emergency procedures before handling.</td>
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IMDG

<table>
<thead>
<tr>
<th>UN number</th>
<th>UN1017</th>
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<tbody>
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<td>Transport hazard class(es)</td>
<td>2.3</td>
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<tr>
<td>Subsidiary class(es)</td>
<td>5.1, 8</td>
</tr>
<tr>
<td>Packaging group</td>
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<tr>
<td>Environmental hazards</td>
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<tr>
<td>Marine pollutant</td>
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<td>Labels required</td>
<td>Not available.</td>
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<td>EmS</td>
<td>F-C, S-U</td>
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<tr>
<td>Special precautions for user</td>
<td>Read safety instructions, SDS and emergency procedures before handling.</td>
</tr>
<tr>
<td>Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

15. Regulatory information

US federal regulations

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

CHLORINE (CAS 7782-50-5) LISTED
Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories
- Immediate Hazard - Yes
- Delayed Hazard - Yes
- Fire Hazard - No
- Pressure Hazard - Yes
- Reactivity Hazard - Yes

SARA 302 Extremely hazardous substance - Yes
SARA 311/312 Hazardous chemical - Yes

SARA 313 (TRI reporting)

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS number</th>
<th>% by wt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHLORINE</td>
<td>7782-50-5</td>
<td>98-100</td>
</tr>
</tbody>
</table>

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List
- CHLORINE (CAS 7782-50-5)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)
- CHLORINE (CAS 7782-50-5)

Clean Water Act (CWA) Section 112(r) (40 CFR 68.130)
- Hazardous substance

Safe Drinking Water Act (SDWA)
- 4 mg/l
- 4.0 mg/l

Food and Drug Administration (FDA)
- Not regulated.

US state regulations

US. Massachusetts RTK - Substance List
- CHLORINE (CAS 7782-50-5)

US. New Jersey Worker and Community Right-to-Know Act
- CHLORINE (CAS 7782-50-5) 100 lbs

US. Pennsylvania RTK - Hazardous Substances
- CHLORINE (CAS 7782-50-5)

US. Rhode Island RTK
- CHLORINE (CAS 7782-50-5)

US. California Proposition 65
This product is not listed, but it may contain elements known to the State of California to cause cancer or reproductive toxicity as listed under Proposition 65 Safe Drinking Water and Toxic Enforcement Act. For additional information, contact Olin Technical Services (800-299-6546).

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance
- Not listed.

International Inventories

<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
<th>On inventory (yes/no)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Australian Inventory of Chemical Substances (AICS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Domestic Substances List (DSL)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Non-Domestic Substances List (NDSL)</td>
<td>No</td>
</tr>
<tr>
<td>China</td>
<td>Inventory of Existing Chemical Substances in China (IECSC)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European Inventory of Existing Commercial Chemical Substances (EINECS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European List of Notified Chemical Substances (ELINCS)</td>
<td>No</td>
</tr>
<tr>
<td>Japan</td>
<td>Inventory of Existing and New Chemical Substances (ENCS)</td>
<td>No</td>
</tr>
<tr>
<td>Korea</td>
<td>Existing Chemicals List (ECL)</td>
<td>Yes</td>
</tr>
<tr>
<td>New Zealand</td>
<td>New Zealand Inventory</td>
<td>Yes</td>
</tr>
<tr>
<td>Philippines</td>
<td>Philippine Inventory of Chemicals and Chemical Substances (PICCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>United States &amp; Puerto Rico</td>
<td>Toxic Substances Control Act (TSCA) Inventory</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date: 23-August-2013

CHLORINE SDS US
914483  Version #: 01  Revision date: -  Issue date: 23-August-2013 7 / 8
List of abbreviations
LD50: Lethal Dose, 50%.
LC50: Lethal Concentration, 50%.
EC50: Effective concentration, 50%.
TWA: Time weighted average.

References
EPA: AQUIRE database
HSDB® - Hazardous Substances Data Bank
US. IARC Monographs on Occupational Exposures to Chemical Agents
IARC Monographs. Overall Evaluation of Carcinogenicity
ACGIH Documentation of the Threshold Limit Values and Biological Exposure Indices

Disclaimer
This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.