Safety data sheet
Chlorine

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

1.1. Product identifier
Product name
Chlorine

EC No (from EINECS): 231-959-5
CAS No: 7782-50-5
Index-Nr. 017-001-00-7
Chemical formula Cl2
REACH Registration number:
01-2119486560-35

1.2. Relevant identified uses of the substance or mixture and uses advised against
Relevant identified uses
Industrial and professional. Perform risk assessment prior to use.
Uses advised against
Consumer use.

1.3. Details of the supplier of the safety data sheet
Company identification
BOC, Priestley Road, Worsley, Manchester M28 2UT
E-Mail Address ReachSDS@boc.com

1.4. Emergency telephone number
Emergency phone numbers (24h): 0800 111 333

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification acc. to Regulation (EC) No 1272/2008/EC (CLP/GHS)
Press. Gas (Liquefied gas) - Contains gas under pressure; may explode if heated.
Ox. Gas 1 - May cause or intensify fire; oxidiser.
Acute Tox. 2 - Fatal if inhaled.
Eye Irrit. 2 - Causes serious eye irritation.
STOT SE 3 - May cause respiratory irritation.
Skin Irrit. 2 - Causes skin irritation.
Aquatic Acute 1 - Very toxic to aquatic life.
- Corrosive to the respiratory tract.

Classification acc. to Directive 67/548/EEC & 1999/45/EC
T; R23 **|** Xi; R36/37/38 **|** N; R50
Toxic by inhalation.
Irritating to eyes, respiratory system and skin.
Very toxic to aquatic organisms.

2.2. Label elements
- Labelling Pictograms

- Signal word
Danger

- Hazard Statements

H280	Contains gas under pressure; may explode if heated.
H270	May cause or intensify fire; oxidiser.
H330	Fatal if inhaled.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H315	Causes skin irritation.
H400	Very toxic to aquatic life.
EUH071	Corrosive to the respiratory tract.

- Precautionary Statements

Precautionary Statement Prevention

P280	Wear protective gloves/protective clothing/eye protection/face protection.
P244	Keep valves and fittings free from oil and grease.
P260	Do not breathe gas, vapours.
P220	Keep away from combustible materials.
P273	Avoid release to the environment.

Precautionary Statement Response

P304+P340+P315	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get immediate medical advice/attention.
P305+P351+P338+P315	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P332 + P313	If skin irritation occurs: Get medical advice/attention.
P370 + P376	In case of fire: Stop leak if safe to do so.

Precautionary Statement Storage

P403	Store in a well-ventilated place.
P405	Store locked up.

Precautionary Statement Disposal
None.

2.3. Other hazards
Contact with liquid may cause cold burns/frost bite.

SECTION 3: Composition/information on ingredients

Substance / Mixture: Substance.

3.1. Substances
Chlorine
CAS No: 7782-50-5
Index-Nr.: 017-001-00-7
EC No (from EINECS): 231-959-5
REACH Registration number:
01-2119486560-35
Contains no other components or impurities which will influence the classification of the product.

3.2. Mixtures
Not applicable.

SECTION 4: First aid measures

4.1. Description of first aid measures
First Aid General Information:
Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.
First Aid Inhalation:
Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped. Prolonged exposure to small concentrations may result in pulmonary oedema. Delayed adverse effects possible.
First Aid Skin / Eye:
May cause chemical burns to skin and cornea (with temporary disturbance to vision) Remove contaminated clothing. Drench affected area with water for at least 15 minutes. Immediately flush eyes thoroughly with water for at least 15 minutes. Obtain medical assistance.
First Aid Ingestion:
Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects, both acute and delayed
May cause irritation to skin. May cause irritation to cornea (with temporary disturbance to vision). May result in pulmonary oedema. Fatal if inhaled.

4.3. Indication of any immediate medical attention and special treatment needed
Obtain medical assistance. Treat with a corticosteroid spray as soon as possible after inhalation

SECTION 5: Fire fighting measures

5.1. Extinguishing media
Suitable extinguishing media
All known extinguishants can be used.

5.2. Special hazards arising from the substance or mixture
Specific hazards
Non flammable. Supports combustion. Exposure to fire may cause containers to rupture/explode.
Hazardous combustion products
None.

5.3. Advice for firefighters
Specific methods
If possible, stop flow of product. Move container away or cool with water from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems. If leaking do not spray water onto container. Water surrounding area (from protected position) to contain fire.
Special protective equipment for fire fighters
Use self-contained breathing apparatus and chemically protective clothing. Clothing for fire-fighters (including helmets, protective boots and gloves) conforming to EN 469 will provide a basic level of protection from chemical incidents. EN 469:2005: Protective clothing for fire-fighters. Performance requirements for protective clothing for fire-fighting.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
Use self-contained breathing apparatus and chemically protective clothing. Evacuate area. Eliminate ignition sources. Ensure adequate air ventilation. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Monitor concentration of released product.

6.2. Environmental precautions
Try to stop release. Reduce vapour with fog or fine water spray.

6.3. Methods and material for containment and cleaning up
Hose down area with water. Wash contaminated equipment or sites of leaks with copious quantities of water. Ventilate area.

6.4. Reference to other sections
See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling
Use no oil or grease. Suck back of water into the container must be prevented. Do not allow backfeed into the container. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Refer to supplier's handling instructions. The substance must be handled in accordance with good industrial hygiene and safety procedures. Only experienced and properly instructed persons should handle gases under pressure. Protect cylinders from physical damage; do not drag, roll, slide or drop. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Leave valve protection caps in place until the

container has been secured against either a wall or bench or placed in a container stand and is ready for use. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Keep container valve outlets clean and free from contaminates particularly oil and water. Never attempt to transfer gases from one cylinder/container to another. Installation of a cross purge assembly between the cylinder and the regulator is recommended. Never use direct flame or electrical heating devices to raise the pressure of a container. Purge system with dry inert gas (e.g. helium or nitrogen) before gas is introduced and when system is placed out of service. Ensure the complete gas system has been (or is regularily) checked for leaks before use.

7.2. Conditions for safe storage, including any incompatibilities
Secure cylinders to prevent them falling. Segregate from flammable gases and other flammable materials in store. Keep container below 50°C in a well ventilated place. Observe all regulations and local requirements regarding storage of containers. Containers should not be stored in conditions likely to encourage corrosion. Containers should be stored in the vertical position and properly secured to prevent falling over. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Do not store with combustible materials, animal feedstuffs, food, or oxidizing agents.

7.3. Specific end use(s)
None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters
Exposure limit value

Value type	value	Note
TLV (ACGIH)	0,5 ppm	ACGIH 1995 - 1996
Great Britain - STEL	0,5 ppm	EH 40/07
ILV	0,5 ppm	(EU) 15 min OEL

Derived No Effect Levels

Type	Exposure	Value	Population	Effects
DNEL	Inhalation, acute	1,5 mg/m3	Workers	Systemic
DNEL	Inhalation, long term	0,75 mg/m3	Workers	Systemic

Predicted No Effect Concentrations

Type	Compartment Detail	Value
PNEC	Fresh water	0,21µg/L
PNEC	Marine water	0,042µg/L
PNEC	Intermittent releases	0,26µg/L
PNEC	STP	0,03mg/L
PNEC	Oral	11,1 mg/kg food

8.2. Exposure controls
Appropriate engineering controls
A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered. Product to be handled in a closed system. Use only permanent leak-tight installations (e.g. welded pipes). Gas detectors should be used when toxic quantities may be released. Keep concentrations well below occupational exposure limits. Provide adequate general or local ventilation. Systems under pressure should be regularly checked for leakages. The substance must be handled in accordance with good industrial hygiene and safety procedures. Consider work permit system e.g. for maintenance activities.
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Personal protective equipment
Eye and face protection
Protect eyes, face and skin from liquid splashes. Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period.Wear a face-shield when transfilling and breaking transfer connections. Safety eyewear, goggles or face-shield to EN166 should be used to avoid exposure to liquid splashes. Wear eye protection to EN 166 when using gases. Full-face mask recommended.
Guideline:
CEN: EN136 Respiratory protective devices. Full face masks. Requirements, testing, marking.
Skin protection
Hand protection
Advice:
Wear working gloves and safety shoes while handling gas cylinders. Chemically resistant gloves complying with EN 374 should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Material:
Viton
Min. Breakthrough time:
480 min
Glove thickness:
0,7 mm
Guideline:
EN 374-1/2/3 Protective gloves against chemicals and micro-organisms

Materials suitable for short-term contact and/or liquid splashes.
Material:
CR(Chloroprene, Polychloroprene rubber)
Min. Breakthrough time:
30 min
Glove thickness:
0,4 mm
Guideline:

EN 374-1/2/3 Protective gloves against chemicals and micro-organisms

Body protection
Keep suitable chemically resistant protective clothing readily available for emergency use. Personal protective equipment for the body should be selected based on the task being performed and the risks involved.
Guideline:
EN 943: Protective clothing against liquid and gaseous chemicals, aerosols and solid particles.
Other protection
Wear working gloves and safety shoes while handling gas cylinders.
Guideline:
ISO 20345 Safety footwear
Respiratory protection
Keep self contained breathing apparatus readily available for emergency use. Use SCBA in the event of high concentrations. The selection of the Respiratory Protective Device (RPD) must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected RPD. When allowed by a risk assessment Respiratory Protective Equipment (RPE) may be used.

Guideline:
EN 136: Respiratory protective devices. Full face masks. Requirements, testing, marking.
Material:
Filter B-P3 Filter B
Guideline:
EN 14387: Respiratory protective devices. Gas filter(s) and combined filter(s). Requirements, testing, marking
Thermal hazards
If there is a risk of contact with the liquid, all protective equipment should be suitable for extremely low temperatures.
Environmental Exposure Controls
Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment. Provide adequate general or local ventilation.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties
General information
Appearance/Colour: Greenish gas
Odour: Pungent
Odour threshold:
Odour threshold is subjective and inadequate to warn for over exposure.
pH value: If dissolved in water pH-value will be affected.
Melting point: -101 °C
Boiling point: -34 °C
Flash point: Not applicable.
Flammability range: Not applicable.
Vapour Pressure 20 °C: 6,8 bar
Relative density, gas: 2,5
Solubility in water: 8620 mg/l
Partition coefficient: n-octanol/water:
Not applicable.
Autoignition temperature: Not applicable.
Thermal decomposition: Not applicable.
Viscosity:
Dynamic: 0,345 mPa.s
Oxidising properties: Oxidiser.
Molecular weight: 71 g/mol
Critical temperature: 144 °C
Relative density, liquid: 1,6

9.2. Other information
Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

10.1. Reactivity
Highly reactive.

10.2. Chemical stability
Stable under ambient conditions.

10.3. Possibility of hazardous reactions
Violently oxidises organic material.

10.4. Conditions to avoid
Avoid moisture in installation systems.

10.5. Incompatible materials
May react violently with combustible materials. May react violently with reducing agents. May react violently with alkalis. Reacts with water to form corrosive acids. With water causes rapid corrosion of some metals. For material compatibility see latest version of ISO-11114.

10.6. Hazardous decomposition products
None.

SECTION 11: Toxicological information

11.1. Information on toxicological effects
Acute oral toxicity
Value: LD50
Species: Rat
Value in non-standard unit: 1100 mg sodium hypochlorite / kg
Acute inhalation toxicity
Value: LC50
Species: Various
Value in non-standard unit: 0,65 mg/m3

Value: LC50
Species: Rat
Exposure time: 1 h
Value in non-standard unit: 293 ppm
Acute dermal toxicity
Value: LD50
Species: Rat
Value in non-standard unit: > 20000 mg sodium hypochlorite / kg
Acute toxicity other routes
Ingestion is not considered a potential route of exposure.
Skin irritation

Irritant
Eye irritation
Irritant, Risk of serious damage to eyes.
Sensitization
No known effects from this product.
Repeated dose toxicity
NOAEL in non-standard unit: 50 mg sodium hypochlorite / kg
Species: Rat
Route of exposure: Oral

NOAEC: 1,5 mg/m3
Route of exposure: Inhalation
Assessment mutagenicity
Memo: Insufficient data.
CarcinogenicityAssessment carcinogenicity
May have carcinogenic effect.
Assessment toxicity to reproduction
No indication of toxic effects.
Other relevant toxicity information
Fatal if inhaled. Risk of serious health injuries in case of long term exposure., Inhalation can cause damage to respiratory tract and lungs., Irritation of respiratory tract., Pulmonary damage is possible., Irritates mucous membranes.

SECTION 12: Ecological information

12.1. Toxicity
Toxic to water organisms., Avoid release to the environment., Product is not allowed to be discharged into ground water or aquatic environment.
Acute and prolonged toxicity fish
Species: Various (Freshwater)
Value type: LC50
Value in standard unit mg/l: 0,06 mg/l
Acute and prolonged toxicity fish
Species: Various (Saltwater)
Value type: LC50
Value in standard unit mg/l: 0,032 mg/l
Acute toxicity aquatic invertebrates
Species: Daphnia magna
Value type: LC50
Value in standard unit mg/l: 0,141 mg/l
Acute toxicity aquatic invertebrates
Species: Crassostrea virginica
Value type: LC50
Value in standard unit mg/l: 0,026 mg/l
Toxicity aquatic plants
Test type: IC50
Species: Chlorella vulgaris
Value type: NOEC
Value in standard unit mg/l: 0,023 mg/l
Toxicity microorganisms
Species: Bacteria
Value type: LC50
Value in standard unit mg/l: 3 mg/l
Chronic toxicity fish
Species: Various (Freshwater)
Exposure time: 28 d
Value type: NOEC
Value in standard unit mg/l: 0,04 mg/l
Chronic toxicity fish
Species: Daphnia magna
Exposure time: 7 d
Value type: NOEC
Value in standard unit mg/l: 0,007 mg/l

12.2. Persistence and degradability

Biodegradation
Not applicable. Not readily biodegradable. Inorganic compound.

12.3. Bioaccumulative potential
The substance has no potential for bioaccumulation.
Biological oxygen demand (BOD)
Not determined
Chemical oxygen demand (COD)
Not determined

12.4. Mobility in soil
The substance has low mobility in soil.

12.5. Results of PBT and vPvB assessment
Not classified as PBT or vPvB.

12.6. Other adverse effects
May cause pH changes in aqueous ecological systems. Depending on local conditions and existing concentrations, disturbances in the biodegradation process of activated sludge are possible.

SECTION 13: Disposal considerations

13.1. Waste treatment methods
Do not discharge into any place where its accumulation could be dangerous. Must not be discharged to atmosphere. Refer to the EIGA code of practice (Doc.30 “Disposal of Gases", downloadable at http://www.eiga.org) for more guidance on suitable disposal methods.
Contact supplier if guidance is required. Dispose of cylinder via gas supplier only. Gases in pressure containers (including halons) containing dangerous substances
EWC Nr. 16 05 04*

SECTION 14: Transport information

ADR/RID

14.1. UN number
1017

14.2. UN proper shipping name
Chlorine

14.3. Transport hazard class(es)
Class: 2
Classification Code: 2TOC
Labels: 2.3, 8, 5.1
Hazard number: 265
Tunnel restriction code: (C/D)
Emergency Action Code: 2XE

14.4. Packing group (Packing Instruction)
P200

14.5. Environmental hazards
Environmentally hazardous.

14.6. Special precautions for user
None.

IMDG

14.1. UN number
1017

14.2. UN proper shipping name
Chlorine

14.3. Transport hazard class(es)
Class: 2.3
Labels: 2.3, 8, 5.1
EmS: F-C, S-U

14.4. Packing group (Packing Instruction)
P200

14.5. Environmental hazards
Environmentally hazardous.

14.6. Special precautions for user
None.

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
Not applicable.

Other transport information
Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers ensure that they are firmly secured. Ensure that the cylinder valve is closed and not leaking. Ensure that the valve outlet cap nut or plug (where provided) is correctly fitted. Ensure that the valve protection device (where provided) is correctly fitted. Ensure adequate ventilation. Ensure compliance with applicable regulations.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture
Seveso Directive 96/82/EC: Listed

15.2. Chemical safety assessment
CSA has not been carried out.

SECTION 16: Other information

Ensure all national/local regulations are observed. Ensure operators understand the toxicity hazard. Users of breathing apparatus must be trained. Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.

Advice
Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted. Details given in this document are believed to be correct at the time of going to press.

Further information
Note:
When using this document care should be taken, as the decimal sign and its position complies with rules for the structure and drafting of international standards, and is a comma on the line.
As an example 2,000 is two (to three decimal places) and not two thousand, whilst 1.000 is one thousand and not one (to three decimal places).

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