Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

CHLORINE

Version:	1.0	Preparation Date :	10/11/2013
Form No:	193238	Revision Date:	10/11/2013

1. IDENTIFICATION OF THE PRODUCT AND OF THE COMPANY/UNDERTAKING

1.1 Product Identifier

Product Name	**CHLORINE**
SDS[1] No	193238
CAS[2] No	7782-50-5
EINECS[3] No	231-959-5
Chemical Name	chlorine
Chemical Formula	Cl_2
Structural Formula	

1.2 Relevant Identified Uses Of The Product And Uses Advised Against

Relevant Identified Uses	Used in water treatment, plastics industry, the production of cleaning products and the chemical industry.
Uses Advised Against	See chapter 16 for a general overview

1.3 Details Of The Supplier Of The Safety Data Sheet

Supplier (Manufacturer)	**AK-KİM KİMYA SAN. VE TİC. A.Ş.** www.akkim.com.tr
Address – Factory	Denizçalı Köyü, Taşköprü Mevkii, P.K. 39 77600 Yalova / TÜRKİYE
Telephone	0 226 815 33 00
Fax	0 226 353 25 39

1.4 Information Providing Authority About Safety Data Sheet

	Ali Haydar KETİR – Environmental Engineer
Telephone	+90 (226) 815 33 00 / 33304
Fax	ali.ketir@akkim.com.tr

1.5 Emergency Telephone Number

Company Emergency	0 226 815 33 00

2. HAZARDS IDENTIFICATION

2.1 Classification Of The Product

2.1.1 Classification According to Regulation (EC) No 1272/2008

- Oxidizing gases, Category 1; H270
- Gases under pressure, liquefied gas; H280
- Acute toxicity, Category 2, inhalation; H330
- Skin irritation, Category 2; H315
- Eye irritation, Category 2; H319
- Specific Target Organ Toxicity (single exposure), Category 3; H335
- Hazardous to the aquatic environment, Acute Category 1; H400

Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

CHLORINE

Version:	1.0	Preparation Date :	10/11/2013
Form No:	193238	Revision Date:	10/11/2013

2.2 Label elements

2.2.1. Labeling According to Regulation (EC) No 1272/2008 [CLP[4]/GHS[5]]

Product Identifier

Hazard Component for Labeling

· chlorine

Hazard Pictograms

Signal Word

· Danger

Hazard Statements

H270	May cause or intensify fire; oxidiser
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
H400	Very toxic to aquatic life

Precautionary Statements

General

· None

Prevention

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

Response

P302+P352	IF ON SKIN: Wash with plenty of soap and water.
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.
P315	Get immediate medical advice/attention
P332+P313	If skin irritation occurs: Get medical advice/attention
P370+P376	In case of fire: Stop leak if safe to do so.

Storage None

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

Disposal

· None

Akkim

Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

CHLORINE

Version:	1.0	Preparation Date :	10/11/2013
Form No:	193238	Revision Date:	10/11/2013

Supplemental Hazard Information (EU) Statements

EUH071 Corrosive to the respiratory tract

2.2.2. Special Rules For Supplemental Label Elements For Certain Mixtures

None.

2.2.3. Additional Labeling

· Not Applicable

2.3 Hazard Identification

2.3.1. Skin Contact

May be harmful if absorbed through skin. Causes skin irritation.

2.3.2. Eye Contact

Causes serious eye burns.

2.3.3. Ingestion

Toxic if swallowed. Causes burns.

2.3.4. Inhalation

May be fatal if inhaled. Causes respiratory tract irritation.

2.3.5. Long term effects

Repeated oral uptake of the substance did not cause substance-related effects. Repeated inhallative uptake of the substance did not cause substance-related effects. The product has not been tested. The statement has been derived from products of a similar structure or composition.

2.3.6. Adverse Environmental Effects

Very toxic to aquatic life

2.4. Additional Information

· None

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Description Of The Substance: Chlorine (100 %)

NAME	EINECS NO	CAS NO.	CONTENT (%)	CLASSIFICATION CLP
Chlorine	231-959-5	7782-50-5	100 %	 DANGER Oxidizing gases, Category 1; H270 Gases under pressure, liquefied gas; H280 Acute toxicity, Category 2, inhalation; H330 Skin irritation, Category 2; H315 Eye irritation, Category 2; H319 Specific Target Organ Toxicity (single exposure), Category 3; H335 Hazardous to the aquatic environment, Acute Category 1; H400

3.2 Additional information

· None

4. FIRST AID MEASURES

4.1 Description of first aid measures

Akkim

Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

CHLORINE

Version:	1.0	Preparation Date :	10/11/2013
Form No:	193238	Revision Date:	10/11/2013

4.1.1 General information

- Remove contaminated clothing.
- In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible).

4.1.2 Following inhalation

- Whilst protecting yourself remove the casualty from the hazardous area and take him to the fresh air.
- Even if there are no complaints, the casualty should be carried or driven (horizontale position; for dyspnea half-upright position). Absolutely avoid any form of bodily exertion.
- Lay the casualty down in a quiet place and protect him against hypothermia.
- As soon as possible repeatedly have the casualty deeply breath a glucocorticoid inhalation spray in.
- In the case of breathing difficulties have the casualty inhale oxygen.
- Immediately call for an emergency physician.
- If the casualty is unconscious but breathing lay him in a stable manner on his side.
- For respiratory arrest, carry out artificial respiration, if possible using a breathing apparatus (e.g. with a bag valve mask). Be very sure to avoid any inhalation of the exhaled air!
- In the case of cardiac arrest (lack of heart beat or pulse) immediately apply heart lung resuscitation. The protection of the vital functions (heartbeat and respiration without assistance) takes priority over every other activity.
- Poisoning symptoms can appear after a period of delay.

4.1.3 Following skin contact

- Following contact with aqueous solution:
- Remove contaminated clothing while protecting yourself.
- Rinse the affected skin areas for 10 minutes under running water.
- Arrange medical treatment.
- Following contact with liquefied chlorine or expanded (extremely cold) gas:
- Whilst protecting yourself, relocate the casualty away from the source of danger.
- First thaw off clothing frozen to the body by rinsing with a lot of cold or lukewarm water and only after that, peel it off carefully. Also rinse skin areas with cold/lukewarm water. Do not rub affected areas and do not use dry heat but cover with a sterile dressing.
- Immediately call a physician to the site of the accident.
- Watch for simultaneous danger of inhalative exposure (measurements see below!)

4.1.4 Following eye contact

- Following contact with gas or aqueous solutions immediately:
- Rinse the affected eye with widely spread lids for 10 minutes under running water whilst protecting the unimpaired eye.
- Following contact with the subcooled/ liquefied gas:
- Carefully rinse the eyes only shortly under running water (cold/ lukewarm but not hot). Do not part lids, leave contact lenses in their place initially.
- Always as soon as possible transport to eye doctor/ hospital..

4.1.5 Following ingestion

Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

CHLORINE

Version:	1.0	Preparation Date :	10/11/2013
Form No:	193238	Revision Date:	10/11/2013

- If chlorine solution have been swallowed:
- Rinse the mouth and spit the fluids out.
- If the casualty is conscious have him drink copious amounts of liquids (water).
- Lay the casualty down in a quiet place and protect him against hypothermia.
- Do not make the casualty vomit.
- During spontaneous vomiting hold the head of the casualty low with the body in a prone position in order to avoid aspiration.
- Call a physician to the site of the accident.

4.1.6 Self-protection of the first aider

- Pay attention to self-protection

4.1.7 Notes for the doctor

- Dependent on the state of matter and concentration, chlorine mainly acts irritating through to corrosively but the main problem is the danger of lung damage..
- - Symptoms of acute poisoning:
- Eyes/Skin: due to gas/aqueous solutions: lacrimation, burning sensation, pain, depending on the concentration superficial epithelial damage through to chemical burns;
- due to liquefied/expanded extremely cold gas: frostbite and chemical burns, danger of blindness
- Inhalation: pungent, irritating in the nose and throat, headache, retrosternal pain, tachypnea, difficulty in breathing, stridor, possible asthmoid complaints; following increasing exposure, increasing danger of damage of the airways/lungs: tracheobronchitis, pulmonary edema and/or pneumonia (after latency) or (at still higher concentrations) very rapid laryngospasm, glottic edema, bronchospasm, possibly reflex respiratory/cardiac arrest
- Ingestion (solutions containing chlorine): burning sensation, pain in the mouth, throat, esophagus, stomach; nausea, vomiting (danger of aspiration) and of corrosive damage of contacted mucous membranes (ulceration, perforation, strictures in the esophagus/ stomach); following aspiration, danger of most serious lung damage; as a consequence of massive corrosion even acute cardiovascular responses (collapse, shock)
- Absorption: less as a consequence of absorption than because of massive tissue damage: disturbance of the CNS (lethargy, unconsciousness up to coma), cardiovascular reactions, possible disturbances of the kidney function..
- - Medical advice:
- ollowing contact with the eyes, first aid measures (rinsing alleviation of pain) must be followed by ophthalmologic treatment as soon as possible.
- Rinse contaminated skin with a lot of water. Irritated areas can be treated with a dermatic containing a corticoid. Following contact with undercooled, liquefied gas, treat analogous to frostbite. Simultaneously watch for inhalative risk.
- Following inhalation, administration of glucocorticoids (inhalatively and/or intravenously) is indicated. In an early phase, inhalation of aerosolized solutions of 0.5 - 2% sodium hydrogen carbonate solution can be attempted (see “Recommendations”).
- All further prophylactic measures for pulmonary edema, but administration of oxygen as necessary intermittently because of possible unfavorable side effects.
- Codeine for tussive irritation, for bronchospasm, additional administration of bronchodilators.

Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

CHLORINE

- Intubation and artificial ventilation can become necessary. Support cardiovascular functions.
- Hospitalize in every case for further diagnostics and treatment.
- Following swallowing of solutions containing chlorine, measures can only be decided considering the situation and the clinical picture. If signs of perforation are definitely absent, gastrolavage in intubation and if possible under supervision should be considered. Administration of glucocorticoids can become necessary in order to prevent glottic edema or damage from aspiration (see measures after inhalation).
- For every suspected case of poisoning, hospitalize the casualty. Prophylaxis for pulmonary edema, monitoring of the cardiovascular, CNS and respiratory functions, diagnostics and treatment of corrosive damage and observation of the acid-base balance and hemogram (in particular leucocyte count) as well as of the kidney functions.
- Recommendations:
- Provide the physician information about the substance/product and treatment already administered.
- In the literature, the possible use of a sodium hydrogen carbonate aerosol for inhalation is indicated. An American report describes that 86 patients who suffered from distinct effects in their airways (cough inspiratory stridor, difficulty in breathing) after inhalation of chlorine gas, were treated with 5% sodium hydrogen carbonate inhalate. Resulting from this, none of the patients developed pulmonary edema and for no patient did the clinical picture deteriorate.
- The following procedure was used: a mixture of 3 ml 8.4% sodium hydrogen carbonate solution and 2 ml isotonic saline solution was nebulized with air or oxygen and inhaled as an aerosol, sometimes even repeatedly.

5. FIRE-FIGHTING MEASURES

5.1 General Information and Flammable Properties

- Substance is non-combustible. Select fire and explosion prevention measures according to the other used substances.
- However, chlorine reacts with iron at temperatures above 170 degree C. This may lead to a "chlorine-iron-fire".
- Protect parts of the system from any warming; if necessary, provide cooling with sprayed water.
- Inspect the electrical fittings regularly against the higher risk of corrosion..

5.2 Extinguishing media:

- Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide

5.3 Unsuitable extinguishing media

- None known.

5.4 Special hazards arising from the product

- Attention! Hazardous decomposition products may occur.
- Hydrogen chloride gas

5.5 Advice for fire-fighters

- Wear NIOSH [6] approved breathing apparatus, eye and face protector and chemical resistant clothes.

Akkim

Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

CHLORINE

Version:	1.0	Preparation Date :	10/11/2013
Form No:	193238	Revision Date:	10/11/2013

- Welding only under supervision.
- Only work on vessels and lines after these have been completely emptied.
- Work that requires fire (e.g. welding or soldering) and is in the vicinity of chlorine-containing pipes or vessels may only be carried out if suitable measures have been taken to prevent them from being heated.

5.6 Additional information

- Cool surrounding containers with water spray.
- Use water spray to cool unopened containers.
- If possible, take container out of dangerous zone.
- Heating causes a rise in pressure, risk of bursting and explosion.
- Shut off sources of ignition.
- Contain vapours with water spray.
- Do not allow runoff to get into the sewage system.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

- Provide adequate ventilation.
- Evacuate area. Warn affected surroundings.
- The hazardous area may only be entered once suitable protective measures are implemented. Only then can the hazardous situation be removed.
- Wear respiratory protection, eye protection, hand protection and body protection (see chapter Personal Protection).
- Attempt to stop the gas from escaping. Otherwise place leaky bottles under a suctioning device or put them outdoors.
- Contain escaping gases/vapours with water.
- Afterwards ventilate area.
- Use plenty of water to clean the area surrounding the leak and equipment that has been in contact with the gas.
- Wear respiratory protection, eye protection, hand protection and body protection (Refer to protective measures listed in section 7 and 8).

6.2 Environmental precautions

- Severe hazard to waters.
- Inform the responsible authorities when only small quantities get into water, drainage, sewer, or the ground.
- Prevent further leakage or spillage if safe to do so.
- Do not let product enter drains.
- Discharge into the environment must be avoided.
- Do not empty into drains or the aquatic environment..

6.3 Methods and material for containment and cleaning up

6.3.1 For containment

- Control personal contact by using protective equipment as required
- Take up contaminated material and pass on for further processing.
- Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13)..

Akkim

Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

CHLORINE

Version:	1.0	Preparation Date :	10/11/2013
Form No:	193238	Revision Date:	10/11/2013

- Afterwards ventilate area and wash spill site.
- Contain for disposal according to local / national regulations.

6.3.2 For cleaning up

- Use protective equipment while cleaning if necessary.
- Use a tested industrial vacuum cleaner or suction device.
- Do not raise dust while cleaning.
- Use of a blower for cleaning is not permitted.
- Only conduct maintenance and other work on or in the vessel or closed spaces after obtaining written permission.
- Only work with vessels and lines after they have been thoroughly rinsed.

6.3.3 Other information

- Dispose of waste material according to local, state and federal regulations.

6.4 Reference to other sections

- Dispose of contaminated material as waste in accordance with section 13.
- See Section 13.

7. HANDLING AND STORAGE

7.1.1 Precautions for safe handling

7.1.2 Protective measures

Personal preventions

- Avoid contact with skin. In case of contact wash skin.
- Avoid contact with eyes. In case of contact rinse the affected eye(s).
- Avoid inhalation of gas.
- Avoid contact with clothing.
- Contaminated clothes must be exchanged and cleaned carefully.

Fire preventions

- The substance/product is non-combustible
- See section 5.

Environmental precautions:

- Dispose of waste material according to local, state and federal regulations.

7.1.3 Advice on general occupational hygiene

- Clean daily.
- Use protective equipment while cleaning if necessary.
- Avoid vapor formation.
- Clean equipment and floor with a great amount of water, never dry.
- Do not raise dust while cleaning.
- Use of a blower for cleaning is not permitted.
- Only conduct maintenance and other work on or in the vessel or closed spaces after obtaining written permission.
- Only work with vessels and lines after they have been thoroughly rinsed.

7.2 Conditions for safe storage, including any incompatibilities

- Do not store cylinders at the working area.
- Do not force open valve.

Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

CHLORINE

Version:	1.0	Preparation Date :	10/11/2013
Form No:	193238	Revision Date:	10/11/2013

- When changing bottles, always inspect the leak-proof closure of the filled and empty bottles.
- Tight valves can be loosened with warm air. The air temperature must not exeed 40 degree C.
- If the pressure cylinder is leaky or there are any ambiguities contact the gas cylinder filling plant.
- Prevent cylinders from falling over.
- Suck back of water into the container must be prevented. Do not allow backfeed into the container.
- Use leak-proof equipment with exhaust for refilling or transfer.
- Refilling or transfer in storage rooms is prohibited.
- Usually transport occurs in containers with high pressure. Use suitable equipment for the transport.
- Tightly screw on the protective caps and blind nuts when transporting. Secure cylinders against falling over, do not throw.
- For liquid chlorine:
- Prevent seepage into flooring (use of a steel tub).

7.1 Advice on common storage

- Keep in locked storage or only make accessible to specialists or their authorised assistants.
- Containers have to be labelled clearly and permanently.
- Store in a cool place.
- Store in a dry place.
- Keep container in a well-ventilated place.
- Any gases that escape from storage rooms for toxic gases must be capable of being safely drawn off or collected and then disposed of. The facilities must be capable of being operated from a safe location.
- Protect from exposure to sunlight.
- Protect from overheating/heating up.
- Protect from moisture.
- Do not store in escape routes, work rooms, or in direct proximity to them.
- For transporting, storing, preparing, emptying, and maintaining pressurized gas bottles, the detailed rules in TRG 280 must be absolutely adhered to. For pressurised gas packaging, observe the applicable TRG 300.

7.2 Specific precautions on storage

- Storage class 2 A (Gases)
- Only substances of the same storage class should be stored together.
- Collocated storage with the following substances is prohibited:
- - Pharmaceuticals, foods, and animal feeds including additives.
- - Infectious, radioactive und explosive materials.
- - Flammable liquids of storage class 3.
- - Other explosive substances of storage class 4.1A.
- - Flammable solid substances or desensitized substances of storage class 4.1B.
- - Spontaneously flammable substances.
- - Substances liberating flammable gases in contact with water.
- - Strongly oxidizing substances of storage class 5.1A.

Akkim

Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

CHLORINE

Version:	1.0	Preparation Date :	10/11/2013
Form No:	193238	Revision Date:	10/11/2013

- *- Oxidizing substances of storage class 5.1B.*
- *- Organic peroxides and self reactive substances.*
- *- Combustible and non combustible acutely toxic substances of stora-ge classes 6.1A and 6.1B.*
- *- Combustible toxic or chronically acting substances of storage class 6.1C.*
- *- Noncombustible toxic or chronically acting substances of storage class 6.1D.*
- *- Combustible liquids of storage class 10.*
- *Under certain conditions the collocated storage with the following sub-stances is permitted:*
- *- Aerosols (spray bottles).*
- *- Ammonium nitrate and preparations containing ammonium nitrate.*
- *- Combustible corrosive substances of storage class 8A.*
- *- Combustible solids of storage class 11.*
- *Consider the regulations of collocated storage of different compressed gases.*
- *The substance should not be stored with substances with which ha-zardous chemical reactions are possible.*
- *Chlorine cylinders, full or empty; should be stored in a dry and cool place and kept away from all kinds of sources of heat. Do not store beside elevators or ventilation systems. The places under ground should not be preferred for storage.*
- *The storage temperature must not be over 55ºC. These cylinders must be stored away from other compressed gas containers. Do not store near turpentine, ether, hydrocarbons, other flammable substances, ammonia and metal granules. Despite of oxidation risk, keep the warehouse clean.*
- *Should be stored where the daily controls and transportation of the full containers can be done with the least effort. Keep the full and empty containers in different places. Keep small cylinders vertical and bigger ones horizontally. .*

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

Preventive industrial and medical examinations must be carried out according to the application area.

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. Instruction must be provided before employment and then at a minimum of once per annum thereafter.

An escape and rescue plan must be prepared when the location, scale, and use of the work-site so demand.

It must be assured that the workplace limit values are being maintained. If the limit values are exceeded, additional protection measures are necessary.

The measurements must be recorded and kept on file.

The number of employees who work with the hazardous substance must be kept to a minimum.

Only employees are permitted to enter the work areas. Signposting to this effect must be displayed

Akkim

Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

CHLORINE

Version:	1.0	Preparation Date :	10/11/2013
Form No:	193238	Revision Date:	10/11/2013

8.1.1 Occupational exposure limits

Components with workplace control parameters

- ACGIH : 0.5 ppm TWA; 1 ppm STEL
- OSHA (final) : 1 ppm Ceiling; 3 mg/m3 Ceiling
- NIOSH : 10 ppm IDLH
- TWA: 0.5 ppmV, 1.5 mg/m3 ; STEL 1 ppmV, 2.9 mg/m3 (UK)

8.2 Exposure controls

- Adequate ventilation should be used during processing
- Risk of percutaneous absorption
- Substances for which local irritant effects determine the exposure limit value, also respiratory allegens

8.2.1 Appropriate engineering controls:

- Provide local exhaust ventilation to control dust/mist/vapors
- In the immediate working surroundings there must be: Emergency shower installed.
- Make available sufficient washing facilities.
- Provide eye shower and label its location conspicuously.
- See Section 7

8.2.2 Personal protection equipment

8.2.2.1 Eye / Face protection:

- Safety glasses with side shields.
- Wear chemical safety goggles.
- If the face is at risk a protective shield must also be worn
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly.

8.2.2.2 Skin protection

Hand protection

- The use of resistant protective gloves is recommended.
- Wear leather gloves to prevent frostbite injuries from rapidly expanding gas when handling pressurised gas bottles.
- Skin protection cremes do not protect sufficiently against the substance. When there is a risk of direct contact with the substance, chemical-resistant gloves are required.

Body protection

- Use protective boots while handling gas cylinders.
- Keep full protective suits made from suitable materials ready to be used in case of an accidental release.
- Protective suits have to be checked for embrittlement after each use.

Akkim

Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

CHLORINE

Version:	1.0	Preparation Date :	10/11/2013
Form No:	193238	Revision Date:	10/11/2013

Other protection

- Handle in accordance with good industrial hygiene and safety practice.

8.2.2.3 Respiratory protection

- In an emergency (e.g.: unintentional release of the substance) respiratory protection must be worn. Consider the maximum period for wear.
- Take along escape filters.
- Respiratory protection: Gas filter B, colour code grey.
- Do not use small filters (filter class 1).
- Perhaps also necessary for improved protection:
- Respiratory protection: Combination filter B - P2 or B - P3, recommended B - P3, colour code grey-white.
- Use insulating device for concentrations above the usage limits for filter devices, for oxygen concentrations below 17% volume, or in circumstances which are unclear..

8.2.3 Environmental exposure controls

- Legislation for the protection of the environment must be met in full.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Appearance

Form/Physical state	Gas
Color	Yellow,
Odor	Pungent

	Value
pH (800 g/l in water solution) @ (20(°C)	Not available
Freezing point/range (°C)	Not available
Boiling point/range (°C)101,3 kPa	-34,50
Melting point (°C)	Not available
Flash Point (°C)closed cup	Not Flammable in Air
Ignition temperature (°C)	Not available
Viscosity cp	0.385 cp at 0 °C / chlorine, liquid
Relative density	2.45 (air=1)
Vapour Density @ 20°C	3,213 kg/m3 (0 oC, 1 atm)
Solubility in water g/l @ 20°C	Very soluble
Vapour pressure	666 kPa @ 20 C
Partition coefficient n-Octanol/Water (log Ko/w)	Not available
Evaporation rate	Very fast When 1 litre of liquid chlorine evaporates, generates 434 litres of chlorine gas
Oxidation Property	Strong oxidizing. The substance or mixture is classified as oxidizing with the subcategory 1.

Note: The above features were determined according to prescribed methods at the Classification, Packaging and Labeling of Hazardous. Substances Regulation Section A-3 or a method comparable to the other.

10. STABILITY AND REACTIVITY

Akkim

Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

CHLORINE

Version:	1.0	Preparation Date :	10/11/2013
Form No:	193238	Revision Date:	10/11/2013

10.1 Reactivity

- The product decomposes while releases SO_2 in ambient temperature and atmospheric pressure
- Contact with acids liberates toxic gas.

10.2 Chemical stability

- Stable under recommended storage and handling conditions. (See section 7.)

10.3 Possibility of hazardous reactions

Risk of explosion in contact with:

- amines
- ammonia
- acetaldehyde; acetylene (UV light); acetylene (Hitze);
- alkylphosphine (impact); amidosulphuric acid;
- ammonium chloride; antimony hydride; aziridine;
- benzine; benzene (vapour/ light); boron hydrides; bromine pentafluoride (heat); butadiene; butane; tert-butyl alcohol; 1-chloro-2-propyne/ iron; hydrogen chloride gas/ air; cyanuric acid; diborane; dibutyl phthalate (heat); diethyl ether; oxygen difluoride; dimethyl formamide; dimethyl sulphoxide; disilyl ether; ethane/coal; ethylene/ air; ethylphosphine; greases;
- fluorine (sparks); glycerin/chlorine liquid; rubber/chlorine liquid; hexachlorodisilane/Wärme; hydrazine; hydrazine sulphate; hydrocarbons; linseed oil/chlorine liquid; methane/ catalyst; phenylmagnesium bromide; phosphorus (white); polypropylene /chlorine liquid; propane (heat); propene (heat); pyridine, chlorinated/ iron; oxygen; carbon disulphide/ iron; nitrogen trichloride; nitrogen triiodide; styrene/ iron(III) chloride; aminosulphonic acid/ water; tetraselenium tetranitride; vanadium powder; wax; hydrogen

The substance can react dangerously with:

- alkali metals
- alcohols
- aluminium
- combustable substances
- reducing agents
- organic substances
- water
- metal powders; arsenic hydride; beryllium powder; boron; caesium acetylide; caesium oxide (heat); calcium; calcium nitride; calcium hydride; hydrogen cyanide; dichlorodimethyl ether; dimethyl ether; dioxan vapour (heat); metal carbides; ethylene oxide; glycerin (occlusion); hydroxylamine; iodine (chlorine liquid); metal hydrides; caoutchouc; coal/ activated carbon; lithium silicide; mercaptans; metals/heat; metals/humidity; methyl vinyl ether; sodium hydroxide; oil; phosphines; phosphides; phosphorus (red); phosphorus trioxide; phosphorus hydride; mercury oxide; hydrogen sulphide; silanes; silver oxide; sulphides; oil of turpentine;
- tungsten oxide (heat); zinc diethyl; tin fluoride;

10.4 Conditions to avoid:

- The substance itself does not burn, but in contact with combustible substances it increases the risk of fire and can fuel any existing fire substantially.

10.5 Incompatible materials:

Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

CHLORINE

- alkali metals
- alcohols
- aluminium
- combustable substances
- reducing agents
- organic substances
- water

10.6 Hazardous decomposition products:

- Reacts with water to form: - hydrochloric acid

10.7 Hazardous polymerization:

- None.

11. TOXICOLOGICAL INFORMATION

11.1 General Information

- The main exposure pathway for chlorine is via the respiratory tract.
- Acute: Irritation to the eyes and airways, danger of serious lung damage; in higher concentrations, corrosive effects to contacted tissues
- Chronic: Irritation to the airways

11.2 Acute toxicity

- LC50 Inhalation - rat - 1 h - 293 ppm

11.3 Skin corrosion/irritation and Eye damage/irritation:

Skin: no data available
Eye: no data available

11.4 CMR effects (Carcinogenity) :

- In long-term studies on rats and mice which inhaled chlorine gas, the incidence of neoplasia was not increased, so that no carcinogenic potential was indicated.
- In view of the chlorination of drinking water, no causal relationship between the intake of chlorine and increased incidence of tumors could be demonstrated in animal experiments and epidemiological studies. Based on these findings, no risk of a carcinogenic action is seen for occupational exposure.
- Carcinogenicity - rat - Oral
- Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Leukaemia
- Carcinogenicity - Monkey - Inhalation
- Tumorigenic: Neoplastic by RTECS criteria. Lungs, Thorax, or Respiration:Tumors.
- 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 component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

11.5 CMR effects (Mutagenicity and Toxicity for reproduction) :

Reproductive toxicity:

- There is no reason to fear a risk of damage to the developing embryo or foetus when MAK and BAT values are observed.
- In view of the oral intake of chlorine via the drinking water, studies with the administration of sodium hypochlorite solution to rodents (dosage up to 5 mg/kg bw x d) did not prove any developmental toxic or fertility disturbing effects.

Akkim

Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

CHLORINE

- For the inhalative exposure to chlorine gas it is expected, because of the corrosive action in the respiratory tract, that the possibility of reaching the concentrations of hypochlorite or chloride which can cause reproductive toxic effects can be excluded.
- Reproductive toxicity - rat - Oral
- Effects on Newborn: Biochemical and metabolic.
- Mutagenicity:
- In a study with chlorine gas up to the cytotoxic concentration, no mutagenicity was found.
- Results from tests with chlorine and sodium hypochlorite solution were not unequivocal but there is no suspicion that it could be mutagenic..

11.6 Other Toxicological Effects:

Allergic Effects	no data available
Effects on Repeated Doses Chronic Exposures	Irritation to the airways
Sensitization	no data available
Developmental Toxicity (Teratogenicity)	No data available concerning teratogenic effects. The chemical structure does not suggest such an effect.
Fertility	The results of animal studies gave no indication of a fertility impairing effect. The product has not been tested. The statement has been derived from products of a similar structure or composition. The chemical structure does not suggest such an effect.

11.7 STOT-single/repeated exposures:

STOT-single exposure	May cause respiratory irritation.
STOT-repeated exposure	No data available

11.8 Symptoms related to the physical, chemical and toxicological characteristics:

In case of inhalation	May be fatal if inhaled. Causes respiratory tract irritation.
In case of skin contact	May be harmful if absorbed through skin. Causes skin irritation.
In case of eye contact	Causes serious eye burns
In case of ingestion	May be harmful if swallowed.

11.9 Additional Toxicological Information:

- Toxicological classifications are based on available knowledge and information
- EEC classification: Toxic.
- The special effects to health are considered by taking into account the information in section 3.
- Signs and Symptoms of Exposure
- Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Cough, Shortness of breath, Headache, Nausea
- RTECS: FO2100000

12. ECOLOGICAL INFORMATION

12.1 Ecotoxicity:

- Acute Fish Tox. (LC50 96 hour): 0,014 mg/l - Oncorhynchus mykiss (rainbow trout)
- Acute Daphnia Toxicity (EC50 48 hour): 0,019 mg/l - Daphnia magna (Water flea)

Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

CHLORINE

Version:	1.0	Preparation Date :	10/11/2013
Form No:	193238	Revision Date:	10/11/2013

- Acute Algea Toxicity (EC50 48 hour): No data available
- Acute Crustaceans Toxicity (EC50 48hour): 0,091 mg/l
- Acute Microorganisms Toxicity (EC10 17hour): No data available

12.2 Photo degradation

No data available.

12.3 Effects on Waste Water Treatment Plants

Not determined.

12.4 Mobility

Gas, Solubility in water: Very soluble
Refer to ecotoxicity.

Water threat class	WGK 2 - hazard to waters
Clean Water Impact	No data available
Known or predicted environmental distribution	No data available

12.5 Results of PBT and vPvB assessment

Biotic	
Ready biodegradability:	No data available
Abiotic:	
Hydrolysis as a function of pH:	No data available
Photolysis:	No data available
Atmospheric oxidation:	No data available

- **Persistence and degradability:**

Decomposition Potential of the products	No data available
The half-life of degradation	No data available
Potential degradation of product content in the evaluation of wastewater treatment plants	No data available

- **Bioaccumulation Potential :**

Biological environment (biota) accumulation potential	No data available
Potential - nutrients pass through	No data available
Reference Values - Log Kow , Sw and BCF	No data available

12.6 Additional information

- Very toxic to aquatic life
- See the sections 6, 7, 13, 14 and 15.

13. DISPOSAL CONSIDERATIONS

13.1 Product / Packaging disposal

- This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use.
- If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means.
- Shelf life considerations should also be applied in making decisions of this type.
- Note that properties of a material may change in use, and recycling or reuse may not always be appropriate

Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

CHLORINE

- When recycling of the product is not possible, disposal to landfill or incineration in accordance with all applicable government laws and regulations is recommended.
- Disposal according to local authority regulations. Contact waste disposal services

13.2 Contaminated packaging

- If there is product residue in the emptied container, follow directions for handling on the container's label. Contaminated packaging must be emptied of all residues and can be recycled following appropriate cleaning.

13.3 Disposal Methods

- Dispose of chemicals waste or in accordance with local regulations.
- Follow all applicable local laws, rules and regulations regarding the proper disposal of this material.
- If this product has been altered or contaminated with other hazardous materials, appropriate waste analysis may be necessary to determine proper method for disposal

13.4 European Waste Catalogue

- The final classification has to be done together with the local waste disposal company / authority.

14. TRANSPORT INFORMATION

UN 1017 CHLORINE

	ADR[7]/RID[8]	ADNR	IMDG[9]	ICAO[10]/IATA[11]
TRANSPORTATION	Road	River	Marine	Airways
PROPER SHIPPING NAME	CHLORINE			
UN/ID No.	1017	1017	1017	1017
SYMBOL				
CLASS	2.3 (Toxic gases)	2.3 (Toxic gases)	2.3 (Toxic gases)	2.3 (Toxic gases)
PACKAGING GROUP	-	-	-	-
LABELLING NO	2.3+5.1+8	2.3+5.1+8	2.3+5.1+8	2.3+5.1+8
CLASSIFICATION CODE	2TOC			
HAZARD NO (HIN NO)	265			
EmS			F-C;S-U	
MARINE Pollutant			YES	

Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

CHLORINE

Version:	*1.0*	*Preparation Date :*	*10/11/2013*
Form No:	*193238*	*Revision Date:*	*10/11/2013*

				
Passenger Aircraft: *Not permitted for transport* ***Cargo Aircraft:*** *Not permitted for transport* ***Special Provisions:*** *"Keep away from heat" label required.*				
Tunnel restrictions: *Transports in tanks: passage forbidden through tunnels of category C, D und E.* *Other transports: passage forbidden through tunnels of category D and E..*				
Road Transport Notes: *This product is regulated as a hazardous material.*				

15. REGULATORY INFORMATION

15.1 Safety, Health And Environmental Regulations / Legislation Specific For The Substance

Substance is found on the following regulatory lists;;

- *"European Union - European Inventory of Existing Commercial Chemical Substances (EINECS) (English)"*
- *The substance in On SVHC list*

15.2 Chemical Safety Assessment

European Union Risk Assessment Report is available dated December 2007 for Chlorine (EINECS No:231-959-5)

15.2.1 HAZARD

CLP classification according to Annex VI of CLP (Regulation (EC) No 1272/2008)

- *May cause or intensify fire; oxidiser*
- *Contains gas under pressure; may explode if heated*
- *Causes skin irritation*
- *Causes serious eye irritation*
- *Fatal if inhaled*
- *May cause respiratory irritation*
- *Very toxic to aquatic life*

15.2.2 RISK

- *Toxic by inhalation.*
- *Irritating to eyes, respiratory system and skin*
- *Very toxic to aquatic organisms.*

15.3 INTERNATIONAL REGULATIONS

- *This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006 and ISO 11014:2009. This product is classified according to EU Directive 67/548/EC and GHS/CLP.*

16. OTHER INFORMATION

16.1 Other information

- *For additional information regarding **AK-KIM KIMYA SAN. VE TIC. ŞTİ.**products please contact the **AK-KIM KIMYA SAN. VE TIC. A.S** Vedat Ateşoğlu - vatesoglu@akkim.com.tr*

Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

CHLORINE

Version:	1.0	Preparation Date :	10/11/2013
Form No:	193238	Revision Date:	10/11/2013

- The above information complies with the 199/45/EC and 1907/2006 Directives and their amendments.
- In all cases of potential poisoning supportive therapy is of the utmost importance.

16.2 Related Person

- Vedat Ateşoğlu - vatesoglu@akkim.com.tr Ak-Kim Kimya San. Ve Tic. A.Ş
- Prepared by : Ali Haydar KETİR - Ak-Kim Kimya San. Ve Tic. A.Ş ali.ketir@akkim.com.tr
- **Competent Person Accreditation no : TSE GBF-0855 28.07.2011**

16.3 Revision Date, Version and SDS no

- Date : October 11, 2013
- Version : 1.0
- MSDS No : 193238

16.4 Reason of re-issue

- Compiling according to Regulation (EC) No 1272/2008

16.5 Relevant R-, H- and EUH-phrases (number and full text):

H270	May cause or intensify fire; oxidiser
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
H400	Very toxic to aquatic life

16.6 Legal disclaimer

- The purpose of the above information is to describe the products only in terms of health and safety requirements.
- The information given should not, therefore, be construed as guaranteeing specific properties or as specification.
- Customers should satisfy themselves as to the suitability and completeness of such information for their own particular use.
- The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication.
- The above information relates only to the specific material(s) designated herein and may not be valid for such material(s) used in combination with any other materials or in any process or if the material is altered or processed, unless specified in the text.
- The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. Due to the many factors outside our control when using this product, we cannot accept liability for any injury, accident, loss or damage caused through its use.

[1] SDS: Safety Data Sheet
[2] CAS: Chemical Abstract Service
[3] EINECS: European INventory of Existing Commercial
[4] CLP:Classification Laballing and Packaging
[5] GHS:Global Harmonised System

Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

CHLORINE

Version:	*1.0*	*Preparation Date :*	*10/11/2013*
Form No:	*193238*	*Revision Date:*	*10/11/2013*

[6] NIOSH-National Institute of Occupational Safety and Health(Ulusal İş Sağlığı ve Güvenliği Enstitüsü)
[7] ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
[8] RID: Regulations Concerning the International Transport of Dangerous Goods by Rail
[9] IMDG: International Maritime Code for Dangerous Goods
[10] ICAO: International Civil Aviation Organization
[11] IATA: International Air Transport Association