

MATERIAL SAFETY DATA SHEET

1. IDENTIFICATION

MATHESON TRI-GAS, INC.
150 Allen Road Suite 302
Basking Ridge, New Jersey 07920
Information: 1-800-416-2505

Emergency Contact:
CHEMTREC 1-800-424-9300
Calls Originating Outside the US:
703-527-3887 (Collect Calls Accepted)

PRODUCT NAME: CHLORINE

TRADE NAMES/SYNONYMS:

MTG MSDS 22; CHLORINE MOLECULAR; DIATOMIC CHLORINE; DICHLORINE; MOLECULAR CHLORINE; UN 1017; Cl₂; MAT04600

CHEMICAL FAMILY: halogens, gas

PRODUCT USE: industrial

RESTRICTIONS ON USE: None known.

2. HAZARDS IDENTIFICATION

GHS CLASSIFICATION:

Oxidizing gas, Category 1

Gas under pressure, Liquefied gas

Acute toxicity, Category 2

Skin corrosion/irritation, Category 1

Eye damage/irritation, Category 1

Specific target organ systemic toxicity following single exposure, Category 1

Specific target organ systemic toxicity following repeated exposure, Category 1

Hazardous to the aquatic environment - acute hazard, Category 1

GHS SYMBOL:



GHS SIGNAL WORD: DANGER

GHS HAZARD STATEMENT:

May cause or intensify fire; oxidizer
Contains gas under pressure; may explode if heated
Fatal if inhaled
Causes severe skin burns and eye damage
Causes serious eye damage
Causes damage to organs
Causes damage to organs through prolonged or repeated exposure
Very toxic to aquatic life

GHS PRECAUTIONARY STATEMENTS: Keep away from clothing and other combustible materials. Do not breathe gas, fumes, vapor, or spray. Do not eat, drink, or smoke when using this product. Keep reduction valves free from grease and oil. Wear respiratory protection. Wear protective gloves/clothing and eye/face protection. Use only outdoors or in a well-ventilated area. In case of fire, stop leak if safe to do so. Wash thoroughly after handling. Avoid release to the environment. **IF IN EYES:** Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. **IF SWALLOWED:** Rinse mouth. Do NOT induce vomiting. **IF INHALED:** Remove victim to fresh air and keep at rest in a position comfortable for breathing. **IF ON SKIN (or hair):** Remove/take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. Immediately call a POISON CENTER or doctor/physician. Specific treatment is urgent, see first aid section of Safety Data Sheet. Store locked up. Keep container tightly closed. Store in a well-ventilated place. Protect from sunlight. Collect spillage. Dispose in accordance with all applicable regulations.

EMERGENCY OVERVIEW:

PHYSICAL HAZARDS: Containers may rupture or explode if exposed to heat. May ignite combustibles.

POTENTIAL HEALTH EFFECTS:

INHALATION:

SHORT TERM EXPOSURE: burns, vomiting, chest pain, difficulty breathing, headache, dizziness, hyperactivity, emotional disturbances, bluish skin color, lung congestion, lung damage, death

LONG TERM EXPOSURE: burns, lack of sense of smell, tooth decay, difficulty breathing, lung damage

SKIN CONTACT:

SHORT TERM EXPOSURE: burns, frostbite

LONG TERM EXPOSURE: burns

EYE CONTACT:

SHORT TERM EXPOSURE: burns, frostbite

LONG TERM EXPOSURE: burns

INGESTION:

SHORT TERM EXPOSURE: ingestion of a gas is unlikely

LONG TERM EXPOSURE: ingestion of a gas is unlikely

3. COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENT: CHLORINE

CAS NUMBER: 7782-50-5

EC NUMBER (EINECS): 231-959-5

EC INDEX NUMBER: 017-001-00-7

PERCENTAGE: 100

4. FIRST AID MEASURES

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

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get immediate medical attention. Thoroughly clean and dry contaminated clothing before reuse. Destroy contaminated shoes.

EYE CONTACT: Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If a large amount is swallowed, get medical attention.

SYMPTOMS/EFFECTS:

ACUTE: respiratory tract burns, skin burns, eye burns, respiratory system effects, central nervous system effects

DELAYED: respiratory tract burns, skin burns, eye burns, kidney damage, tooth erosion, respiratory system effects

NOTE TO PHYSICIAN: For inhalation, consider oxygen. Avoid gastric lavage or emesis.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Oxidizer. May ignite or explode on contact with combustible materials. Containers may rupture or explode if exposed to heat.

EXTINGUISHING MEDIA: water

Large fires: Flood with fine water spray.

UNSUITABLE EXTINGUISHING MEDIA: Do not use dry chemicals, carbon dioxide or halogenated extinguishing agents.

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. For small fires, contain and let burn. Use extinguishing agents appropriate for surrounding fire. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay

upwind and keep out of low areas. Evacuation radius: 800 meters (1/2 mile).

FIRE FIGHTING PROTECTIVE EQUIPMENT: Wear full protective fire fighting gear including self contained breathing apparatus (SCBA) for protection against possible exposure.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS:

Wear personal protective clothing and equipment, see Section 8.

EMERGENCY PROCEDURES:

Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so. Reduce vapors with water spray.

ENVIRONMENTAL PRECAUTIONS:

Avoid release to the environment. Keep out of water supplies and sewers. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

METHODS AND MATERIALS FOR CONTAINMENT AND CLEANUP:

Stop leak if safe to do so - Prevent entry into waterways, drains, or confined areas. Do not touch spilled material. Eliminate all ignition sources if safe to do so. Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering. Damaged cylinders should be handled only by specialists.

7. HANDLING AND STORAGE

HANDLING: Subject to handling regulations: U.S. OSHA 29 CFR 1910.119.

STORAGE: Store and handle in accordance with all current regulations and standards. Protect from physical damage. Keep separated from incompatible substances. Store outside or in a detached building. Store in a cool, dry place. Store in a well-ventilated area. NFPA 430 Code for the Storage of Liquid and Solid Oxidizing Materials. Protect from sunlight. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Notify State Emergency Response Commission for storage or use at amounts greater than or equal to the TPQ (U.S. EPA SARA Section 302). SARA Section 303 requires facilities storing a material with a TPQ to participate in local emergency response planning (U.S. EPA 40 CFR 355.30). Keep separated from incompatible substances.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE LIMITS:

CHLORINE:

1 ppm (3 mg/m³) OSHA ceiling
0.5 ppm (1.5 mg/m³) OSHA TWA (vacated by 58 FR 35338, June 30, 1993)
1 ppm (3 mg/m³) OSHA STEL (vacated by 58 FR 35338, June 30, 1993)
0.5 ppm ACGIH TWA
1 ppm ACGIH STEL
0.5 ppm (1.45 mg/m³) NIOSH recommended ceiling 15 minute(s)

BIOLOGICAL LIMIT VALUES:

CHLORINE:

No biological limit value(s) available.

ENGINEERING CONTROLS: Ensure adequate ventilation. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing. For the liquid: Wear appropriate protective, cold insulating clothing.

GLOVES: Wear appropriate chemical resistant gloves.

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH: 10 ppm

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.

5 ppm

Any air-purifying half-mask respirator equipped with cartridge(s) providing protection against the compound of concern.

Any supplied-air respirator.

10 ppm

Any supplied-air respirator operated in a continuous-flow mode.

Any powered, air-purifying respirator with cartridge(s) providing protection against this substance.

Any air-purifying respirator with a full facepiece and a canister providing protection against this substance.

Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted canister providing protection against the compound of concern.

Any self-contained breathing apparatus with a full facepiece.

Any supplied-air respirator with a full facepiece.

Emergency or planned entry into unknown concentrations or IDLH conditions -

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

Escape -

Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted

canister providing protection against the compound of concern.
Any appropriate escape-type, self-contained breathing apparatus.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: gas
COLOR: yellow or green
ODOR: distinct odor, irritating odor
MOLECULAR WEIGHT: 70.906
MOLECULAR FORMULA: Cl₂
BOILING POINT: -35 C
FREEZING POINT: -101 C
FLASH POINT: not flammable
LOWER FLAMMABLE LIMIT: Not available
UPPER FLAMMABLE LIMIT: Not available
AUTOIGNITION: Not available
DECOMPOSITION POINT: Not available
VAPOR PRESSURE: 5168 mmHg @ 21 C
VAPOR DENSITY (air=1): 2.49
SPECIFIC GRAVITY (water=1): 1.5649 @ -35 C (liquid)
DENSITY: 3.214 g/L @ 0 C
WATER SOLUBILITY: 1.46% @ 0 C
PH: Not applicable
VOLATILITY: Not applicable
ODOR THRESHOLD: 0.01 ppm
EVAPORATION RATE: Not applicable
VISCOSITY: 0.01327 cP @ 20 C
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not applicable
OCTANOL/WATER PARTITION COEFFICIENT (LOG K_{ow}): Not available
SOLVENT SOLUBILITY:
Soluble: alkali, chlorides, alcohols

10. STABILITY AND REACTIVITY

STABILITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: Avoid contact with combustible materials. Minimize contact with material. Avoid inhalation of material or combustion by-products. Keep out of water supplies and sewers. May ignite or explode on contact with combustible materials.

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

HAZARDOUS DECOMPOSITION:

Thermal decomposition products or contact with water or moisture: hypochlorous acid, hydrochloric acid
Thermal decomposition products: chlorine

POSSIBILITY OF HAZARDOUS REACTIONS: Will not polymerize.

11. TOXICOLOGICAL INFORMATION

CHLORINE:

LIKELY ROUTES OF EXPOSURE: inhalation, skin, eyes

ASPIRATION HAZARD: Not applicable.

SENSITIZER:

DERMAL: No data available.

RESPIRATORY: No data available.

EFFECTS FROM EXPOSURE:

IMMEDIATE: respiratory tract burns, skin burns, eye burns, respiratory system effects, central nervous system effects

DELAYED: respiratory tract burns, skin burns, eye burns, tooth erosion, kidney damage, respiratory system effects

IRRITATION DATA: No data available.

TOXICITY DATA: 500 ppb/2 day(s) intermittent inhalation-human TCLO; 2530 mg/m³/30 minute(s) inhalation-human LCLO; 500 ppm/5 minute(s) inhalation-human LCLO; 66 ppm/1 hour(s) inhalation-human TCLO; 293 ppm/1 hour(s) inhalation-rat LC50; 137 ppm/1 hour(s) inhalation-mouse LC50; 800 ppm/30 minute(s) inhalation-dog LCLO; 3200 ppm/3 hour(s) inhalation-guinea pig LCLO; 500 ppm/5 minute(s) inhalation-mammal LCLO; 145 mg/m³/30 minute(s) inhalation-dog TCLO; 1100 mg/m³/10 minute(s) inhalation-mouse LCLO; 368 mg/m³/30 minute(s) inhalation-mouse LC50; 870 mg/m³/1 hour(s) inhalation-cat TCLO; 870 mg/m³/1 hour(s) inhalation-rabbit TCLO; 870 mg/m³/1 hour(s) inhalation-guinea pig TCLO; 29 mg/m³ inhalation-cat TCLO; 29 mg/m³ inhalation-rabbit TCLO; 29 mg/m³ inhalation-guinea pig TCLO; 2900 mg/m³/35 minute(s) inhalation-horse, donkey LCLO; 2900 mg/m³/5 minute(s) inhalation-human LCLO; 100 mg/m³/30 minute(s) inhalation-human LCLO; 0.9 mg/m³ inhalation-human TCLO; 2.9 mg/kg oral-human TDLo; 3 mg/m³ inhalation-rat TCLO; 10 mg/m³ inhalation-rat TCLO; 0.6 ppm/15 minute(s) inhalation-mouse TCLO; 1330 ppm/15 minute(s) inhalation-rat TDLo; 1330 ppm/15 minute(s) inhalation-rat TCLO; 3312 mg/kg/92 day(s) continuous oral-rat TDLo; 109 gm/kg/2 year(s) continuous oral-rat TDLo; 9 ppm/6 hour(s)-6 week(s) intermittent inhalation-rat TCLO; 7568 mg/kg/28 day(s) continuous oral-rat TDLo; 42 gm/kg/2 week(s) continuous oral-rat TDLo; 9100 ppb/6 hour(s)-5 day(s) intermittent inhalation-rat TCLO; 400 ppb/6 hour(s)-2 year(s) intermittent inhalation-rat TCLO; 153 gm/kg/73 week(s) continuous oral-mouse TDLo; 9100 ppb/6 hour(s)-5 day(s) intermittent inhalation-mouse TCLO; 400 ppb/6 hour(s)-2 year(s) intermittent inhalation-mouse TCLO; 2300 ppb/6 hour(s)-1 year(s) intermittent inhalation-monkey TCLO; 3 mg/m³/24 hour(s)-5 day(s) continuous inhalation-rat TCLO; 10 mg/m³/24 hour(s)-5 day(s) continuous inhalation-rat TCLO; 26 mg/m³/6 hour(s)-6 week(s) intermittent inhalation-rat TCLO; 2.9 mg/m³/6 hour(s)-6 week(s) intermittent inhalation-rat TCLO; 1.7 mg/m³/5 hour(s)-38 week(s) intermittent inhalation-rabbit TCLO; 136.5 mg/kg/13 week(s) continuous oral-rat TDLo; 36.2 gm/kg/69 week(s) continuous oral-rat TDLo; 30.2 gm/kg/69 week(s) continuous oral-rat TDLo

CARCINOGEN STATUS: ACGIH: A4 -Not Classifiable as a Human Carcinogen

LOCAL EFFECTS:

Corrosive: inhalation, skin, eye

TARGET ORGANS: teeth, respiratory system, kidneys, central nervous system, eyes, skin

CHRONIC EFFECTS:

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

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: heart problems

TUMORIGENIC DATA: 5096 mg/kg oral-rat TDLo/2 year(s) continuous; 2300 ppb inhalation-monkey TDLo/6 hour(s)-1 year(s) intermittent; 5047 mg/kg oral-rat TDLo/103 week(s) continuous

MUTAGENIC DATA: mutation in microorganisms - Salmonella typhimurium 1800 ug/L (-S9); cytogenetic analysis - human lymphocyte 20 ppm; sperm - mouse oral 20 mg/kg 5 day(s)-continuous

REPRODUCTIVE EFFECTS DATA: 565 mg/kg oral-rat TDLo 8 week(s) male week(s) pre pregnancy/2 week(s) post pregnancy/3 week(s) continuous

12. ECOLOGICAL INFORMATION

ECOTOXICITY DATA:

FISH TOXICITY: 390 ug/L 96 hour(s) LC50 (Mortality) Orangethroat darter (*Etheostoma spectabile*)

INVERTEBRATE TOXICITY: 637.5 ug/L 1 hour(s) LC50 (Mortality) Pacific oyster (*Crassostrea gigas*)

ALGAL TOXICITY: 50-1000 ug/L 23 hour(s) (Population) Algae, phytoplankton, algal mat (Algae)

PHYTOTOXICITY: 20 ug/L 96 day(s) (Growth) Water-milfoil (*Myriophyllum spicatum*)

FATE AND TRANSPORT:

BIODEGRADATION: No data available.

MOBILITY: No data available.

PERSISTENCE: No data available.

ABIOTIC DEGRADATION: Rapidly undergoes disproportionation in water to form hypochlorous acid and chloride ion.

BIOCONCENTRATION: This material is believed not to bioaccumulate.

ATMOSPHERIC PROCESSES: Undergoes rapid photodissociation in air.

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. Dispose in accordance with all applicable regulations.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:

PROPER SHIPPING NAME: Chlorine

ID NUMBER: UN1017

HAZARD CLASS OR DIVISION: 2.3

LABELING REQUIREMENTS: 2.3; 8

QUANTITY LIMITATIONS:

PASSENGER AIRCRAFT OR RAILCAR: Forbidden

CARGO AIRCRAFT ONLY: Forbidden

ADDITIONAL SHIPPING DESCRIPTION: Toxic-Inhalation Hazard Zone B

MARINE POLLUTANT: CHLORINE

MARITIME TRANSPORT IMDG:

PROPER SHIPPING NAME: Chlorine

UN NUMBER: UN1017

CLASS OR DIVISION: 2.3

SUBSIDIARY RISK(S): 8

MARINE POLLUTANT: CHLORINE

15. REGULATORY INFORMATION

U.S. REGULATIONS:

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):

CHLORINE: 10 LBS RQ

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):

CHLORINE: 100 LBS TPQ

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40):

CHLORINE: 10 LBS RQ

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):

ACUTE: Yes

CHRONIC: Yes

FIRE: Yes

REACTIVE: No

SUDDEN RELEASE: Yes

SARA TITLE III SECTION 313 (40 CFR 372.65):

CHLORINE

OSHA PROCESS SAFETY (29CFR1910.119):

CHLORINE: 1500 LBS TQ

STATE REGULATIONS:

California Proposition 65: Not regulated.

CANADIAN REGULATIONS:

WHMIS CLASSIFICATION: A, D1A, E.

NATIONAL INVENTORY STATUS:

U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CANADA INVENTORY (DSL/NDSL): Listed on DSL.

16. OTHER INFORMATION

NFPA RATINGS (SCALE 0-4): HEALTH=4 FIRE=0 REACTIVITY=0



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