**Potential Industries and applications for chlorine detection:**

- Swimming Pools
- Dry Cleaning
- Textile Mills
- Plastics Manufacture
- Fertilizer Manufacture
- Pharmaceutical Manufacture
- Chemical Manufacture
- Municipal Water Treatment Plants
- Industrial Water Treatment Plants

**Chlorine (Cl)** is the chemical element with atomic number 17. The chloride ion, which is part of common salt (NaCl) and other compounds, is abundant in nature and necessary to most forms of life, including humans.

Chlorine is among the ten highest volume chemicals made in the United States. At room temperature, chlorine is yellow-green gas with a pungent, irritating odor similar to bleach. It is typically pressurized and cooled for storage and shipment as an amber-colored liquid. Chlorine does not combust easily but may combine with other common substances to form explosive compounds.

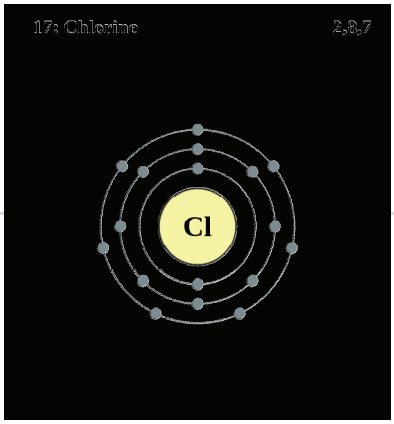
Chlorine has a variety of uses: to disinfect water as part of the waste water sanitation process for sewage and industrial waste; as a bleaching agent during the production of paper and cloth; in cleaning products, including household bleach; and in the preparation of chlorides, cleaning solvents, pesticides, polymers, synthetic rubbers, and refrigerants.

Because of its widespread use in industrial and commercial locations, exposure to chlorine can occur from an accidental spill or release, or from a deliberate terrorist attack. The most harmful route of exposure is from breathing chlorine gas. Exposure may also result from skin contact or eye contact with chlorine gas or by swallowing chlorine-contaminated food or water.

When chlorine enters the body as a result of breathing, swallowing, or skin contact, it reacts with water to produce acids. The acids are corrosive and damage cells in the body on contact. Most harmful chlorine exposures are the result of inhalation. Health effects typically begin within seconds to minutes. Common symptoms of chlorine exposure include: airway irritation, wheezing, difficulty breathing, sore throat, cough, chest tightness, eye and skin irritation

The severity of health effects depend upon the route of exposure, the dose, and the duration of exposure. Breathing high levels of chlorine causes fluid build-up in the lungs, a condition known as pulmonary edema, which may not be apparent until several hours after exposure.

## Chlorine (Cl)




| General | |
|---|---|
| Systematic Name | Chlorine |
| Other Names | |
| Molecular Formula | Cl |
| Appearance | Pale Yellow-Green, bleach odored gas |
| CAS Number | 7782-50-5 |
| **Properties** | |
| Molecular Weight | 28.010 g mol |
| Vapour Density | 1.145 g/L @ 25 °C |
| Melting Point | -101.5 °C, -150.7 °F |
| Boiling Point | -34.04 °C, -29.27 °F |
| **Hazards** | |

| ACGIH-TLV | |
|---|---|
| Time Weighted Value (TWV) | Short Term Exposure Limit (STLV) |
| 0.5ppm | 1ppm |

| OSHA-PEL | |
|---|---|
| Permissible Exposure Limit - Time Weighted Average (TWA) | Permissible Exposure Limit (PEL) |
| 0.5ppm | 1ppm |

| NIOSH | |
|---|---|
| Permissible Exposure Limit - Time Weighted Average | Immediately Dangerous to Life or Health |
| 0.5ppm | 30ppm |

**Industrial Applications**

**Production of industrial and consumer products**
Chlorine is used in making plastics, solvents for dry cleaning and metal degreasing, textiles, agrochemicals and pharmaceuticals, insecticides, dyestuffs, household cleaning products, etc.

**Purification and disinfection**
Chlorine is an important chemical for water purification (used in water treatment plants), in disinfectants, and in bleach. Chlorine in water is more than three times as effective as a disinfectant against e*scherichia coli* (e. coli) than an equivalent concentration of bromine and is more than six times more effective than an equivalent concentration of iodine. In the form of hypochlorous acid, it kills bacteria and other microbes in drinking water supplies and public swimming pools. In most private swimming pools, sodium hypochlorite is used, formed from chlorine and sodium hydroxide, or solid tablets of chlorinated isocyanurates.

It is often impractical to store and use poisonous chlorine gas for water treatment, so alternative methods of adding chlorine are used. These include hypochlorite solutions, which gradually release chlorine into the water, and compounds like sodium dichloro-s-triazinetrione and trichloro-s-triazinetrione. When added in small amounts to water, the chlorine atoms hydrolyze from the rest of the molecule forming hypochlorous acid (HOCl), which acts as a general biocide, killing germs, micro-organisms, algae, and so on.

**Other uses**
Chlorine is used in the manufacture of numerous organic chlorine compounds. Those with the highest production volumes are 1,2-dichloroethane and vinyl chloride, intermediates in the production of PVC.

Other particularly important organo-chlorines are methyl chloride, methylene chloride, chloroform, vinylidene chloride, trichloroethylene, perchloroethylene, alkyl chloride, epichlorohydrin, chlorobenzene, dichlorobenzenes, and trichlorobenzenes. Chlorine is also used in the production of chlorates and in bromine extraction.

**Conspec's CN Series** is an economical choice as a "smart" chlorine gas detector. An industry standard 4-20mA analog output signal. Can be connected to any existing PLC, DCS, or EMS system.

## Specifications:

| Mechanical | |
|---|---|
| Enclosure | NEMA 4x |
| Dimensions | 4.5"x5"x4" |
| Weight | 1 ¼ lbs. |
| Mounting | 4 holes |
| Conduit Entry | One (3/4" cable grip) |
| **Environmental** | |
| Operating Temperature | -4°F - 120°F (-20°C - 50°C) |
| Temperature Compensation | Full Temperature Range |
| Operating Humidity | 10% - 90% RH Non-condensing |
| **Electrical** | |
| Operating Voltage | 12 - 24VDC |
| Cable Requirements | 3 Conductor 18 AWG Suggested |
| Current Consumption | 50mA Full-Scale |
| Output Signal | Linear 4-20mA, RS-485 (optional) |
| **System** | |
| Sensor Ranges Chlorine | 0-10ppm, 0-20ppm |
| Sensor Type | Electrochemical |
| Keypad | 9-Button Infrared Remote Control |
| Modes | 2 (Normal & Calibration) |
| Display | Two-Line, 8-Character Alphanumeric LCD Display |
| Status LEDs | 3 LEDs, 4 Status |
| Alarms | 2 User-Defined |

**Conspec's CX Series** is an economical choice for chlorine gas monitoring. The CX Series is a simple "smart" gas detector designed for use in hazardous or classified locations. Industry standard 4-20mA analog output signal. Can be connected to any existing PLC, DCS, or EMS system.

## Specifications:

| Mechanical | |
|---|---|
| Enclosure | Explosion Proof UL Listed Class 1 Div. 1 or 2 Groups B, C & D |
| Dimensions | 4.5"x5"x4" |
| Weight | 4 lbs. |
| Mounting | Conduit Mounted |
| Conduit Entry | One (3/4" cable grip) |
| **Environmental** | |
| Operating Temperature | -4°F - 120°F (-20°C - 50°C) |
| Temperature Compensation | Full Temperature Range |
| Operating Humidity | 10% - 90% RH Non-condensing |
| **Electrical** | |
| Operating Voltage | 12-24VDC |
| Cable Requirements | 3 Conductor 18 AWG Suggested |
| Current Consumption | 50mA Full-Scale |
| Output Signal | Linear 4-20mA, RS-485 (optional) |
| **System** | |
| Sensor Ranges Chlorine | 0-10ppm, 0-20ppm |
| Sensor Type | Electrochemical |
| Keypad | 9 Button Infrared Remote Control |
| Modes | 2 (Normal & Calibration) |
| Display | Two-Line, 8-Character Alpha-numeric LCD Display |
| Status LEDs | 3 LEDs, 4 Status |
| Alarms | 2 User Defined |

**Conspec's new Smart Head Gas Monitoring System** monitors, records, and stores data; warns and advises if replacement is needed.

**Conspec's Smart Head Single Channel Monitor** and **Smart Head Multi-Channel Controller** are smarter than your average monitors because they are digital, yet simpler and more reliable.

## Specifications:

| Mechanical | |
|---|---|
| Enclosure | NEMA 4x |
| Dimensions | 7.5" x 5" x 3" |
| Weight | 3 ½ lbs. |
| Mounting | Plate -mounted, 6 holes for suspension, grooves for slot mounting |
| Conduit Entry | One (3/4" cable grip) |
| **Environmental** | |
| Operating Temperature | -4°F - 120°F (-20°C - 50°C) |
| Temperature Compensation | Full Temperature Range |
| Operating Humidity | 10% - 90% RH Non-condensing |
| **Electrical** | |
| Operating Voltage | 12-24VDC |
| Cable Requirements | 4 Conductor 18 AWG Suggested |
| Current Consumption | 50mA Full-scale |
| Output Signal | RS-485; 4 Open Collector Digital Output, Linear 4-20mA (Single- Channel only); HART (Optional). |
| **System** | |
| Sensor Ranges Chlorine | 0-10ppm, 0-20ppm |
| Sensor Type | Electrochemical |
| Keypad | 4 Button Keypad or Infrared Remote Control |
| Modes | 2 (Normal & Calibration) |
| Display | 3.5" LCD Display |
| Status LEDs | 4 LEDs, 4 Status |
| Alarms | 3 User Defined |

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