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IF THE USER DOES NOT ACCEPT THE FOLLOWING TERMS, THE USER SHOULD NOT USE THE CHROMAIR BADGES AND COLOR COMPARATORS.

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Warning: Keep out of reach of children, if ingested seek medical attention immediately.



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Operating Instructions For
Chlorine Monitor
(Part Number: 380004)

Technical Summary

Physical Specifications:

Dimensions	10.5 cm x 5.5 cm x 0.25 cm
Weight	11 g
Refrigerated shelf life	2 years
Color change	yellow to orange

Sampling Parameters:

Exposure range for:	
Badge	0.4 - >13 ppm•hr
Badge used with color comparator	0.4 - 20 ppm•hr
Maximum recommended sampling time	2 days
Minimum recommended sampling time	15 minutes
Relative humidity range	35% - 85%
Face velocity range	5 - 150 cm/sec
Temperature range	10°C - 35°C (59°F - 95°F)
Mean coefficient of variation	±10.6
Bias at ambient conditions	3.7%
Light effect - UV (direct sunlight)	no effect
Light effect - visible	no effect

Applications:

The ChromAir chlorine badge may be used for personnel or area monitoring for exposure times ranging from 15 minutes to 48 hours. For higher resolution, the ChromAir chlorine badge may be used in conjunction with the ChromAir chlorine color comparator (part number: 384005).

Cross Interferences:

The ChromAir chlorine badge was treated in atmospheres containing at least two times the OSHA PEL for the following substances: alcohols, aromatic hydrocarbons, halogenated hydrocarbons, aldehydes and carbon monoxide. These substances showed no effect on the performance of the ChromAir chlorine badge. Bromine and iodine react with approximately the same sensitivity. Hydrogen chloride and hydrochloric acid at concentrations greater than 1 ppm can seriously impair the performance of the badge. No other interferences are known.

Temperature Correction:

To obtain best results when sampling at temperatures higher than 27°C (80.6°F), subtract 1.5% of the results obtained from the color comparator for every 1°C (1.8°F) greater than 27°C (80.6°F).

Introduction

Chlorine is a greenish-yellow gas with a pungent, irritating odor. Generally, chlorine is a potent respiratory system irritant. Mild exposures to chlorine cause burning of eyes, nose and mouth. Exposure to concentrations as high as 1000 ppm is likely to be fatal after a few deep breaths. The NIOSH PEL for chlorine is 0.5 ppm (ceiling), whereas the OSHA PEL is 1ppm (ceiling).

Chlorine is an important chemical commodity widely used in the production of safe drinking water. It is also extensively used in the production of paper products, dyestuffs, textiles, petroleum products, chlorinated solvents, etc.

Principle of Operation

The ChromAir passive monitor is a patented direct-read autogenic exposimeter. The device is constructed from six cells attached on one side to a flat indicator layer and on the other side to a series of different diffusive resistances. Chlorine gas diffuses to the cells through the different diffusive resistances and reacts with the indicator layer, producing color change from yellow to orange. The color produced on the indicator layer is a direct measure of the exposure dose. Visual color comparison is achieved by observing the formation of the orange threshold color on the individual cell and reading the corresponding exposure dose.

Operating Instructions

1. Remove the pouch from refrigerator and allow it to warm to room temperature.
2. Remove the badge from its protective pouch.
3. Enter all pertinent information on the I.D. label before monitoring is started (i.e. name, location, date and start time).
4. For personnel monitoring, attach the badge near the user's breathing zone (i.e. collar) with the front side exposed to the surrounding atmosphere.
5. For area monitoring, attach the badge to a stand and mount in a centralized area with the front side exposed to the surrounding atmosphere.
6. Check the back side of the badge periodically to determine the exposure dose (ppm•hr).
7. To read the badge, locate the highest level cell with orange threshold color.
8. **To read the badge with the color comparator, after sampling, return badge to its original pouch and let stand for one hour to allow complete color development. Read the badge no later than 24 hours after exposure.**
9. To obtain the average concentration (ppm) in the surrounding atmosphere, divide the exposure dose (ppm•hr) by the exposure time in hours. EXAMPLE: If the sampling time is 2 hours and the badge reads 4 ppm•hr, the average concentration is determined by:

$$\frac{4 \text{ ppm}\cdot\text{hr}}{2 \text{ hr}} \quad \text{Therefore the average concentration is 2 ppm.}$$

Storage

The ChromAir chlorine monitor should be refrigerated in its sealed bag at all times.

Benefits

1. **Accurate Measurements:** The ChromAir chlorine monitor is designed to react selectively with chlorine with minimum interference from other substances. The unique design of the monitor minimizes the effects of different humidities, temperatures and air velocities on the accuracy of measurements.
2. **Applications:** The ChromAir monitor may be used for personnel screening and for area monitoring or area mapping.
3. **Ease of Use:** The ChromAir monitor is a direct-read device that gives immediate, on-site results. Use of this device requires minimum training.
4. **Cost Effective:** The ChromAir chlorine monitor offers the user the most inexpensive air sampling solution available.

Other Available Monitors

1. ChromAir Badges:

Acetone	Formaldehyde	Methanol
Ammonia	Glutaraldehyde	Methyl ethyl ketone
Carbon monoxide	Hydrogen Sulfide	Methyl isobutyl ketone
Ethanol	Mercury	Ozone
2. ChromAir Color Comparators:

Ammonia	Hydrogen sulfide
Carbon monoxide	Mercury
Formaldehyde	

If you require ChromAir monitors for a chemical hazard not listed, please contact Morphix Technologies® for a free compound consultation at (800) 808-2234.