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



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Operating Instructions For Carbon Monoxide Monitor (Part Number: 380008)

Technical Summary

Physical Specifications:

Dimensions	10.5 cm x 5.5 cm x 0.25 cm
Weight	11 g
Refrigerated shelf life	1 year
Color change	light brown to black

Sampling Parameters:

Exposure range for:	
Badge	10 - 525 ppm•hr
Badge used with color comparator	4 - 630 ppm•hr
Maximum recommended sampling time	48 hours
Minimum recommended sampling time	5 minutes
Relative humidity range	19% - 85%
Face velocity range	10 - 165 cm/sec
Temperature range	10°C - 45°C (50°F - 113°F)
Mean coefficient of variation	±10.5
Bias at ambient conditions	-2.3%
Light effect - UV (direct sunlight)	no effect
Light effect - visible	no effect

Applications:

The ChromAir carbon monoxide badge may be used for personnel or area monitoring for exposure times ranging from 5 minutes to 48 hours. For higher resolution, the ChromAir carbon monoxide badge may be used in conjunction with the ChromAir carbon monoxide color comparator (part number: 384006).

Cross Interferences:

Up to 25 ppm ammonia shows no influence on the ChromAir carbon monoxide badge. Hydrogen sulfide and ethylene react with approximately the same sensitivity. High concentrations of acetylene and hydrogen cause false positive readings. No other interferences are known.

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Introduction

Carbon monoxide is a colorless, odorless gas. It is the only commonly used industrial gas which is both highly toxic and odorless. Symptoms of exposure to carbon monoxide include headaches, palpitations, dizziness, weakness and nausea. Low levels of carbon monoxide in air, which are not immediately hazardous to life, may impair reaction time or sensory perception. Chronic exposure to low levels of carbon monoxide may adversely affect the cardiovascular system. Loss of consciousness and death may result from continued or more intense exposure. OSHA exposure limit for carbon monoxide is 50 ppm (TWA). NIOSH exposure limit for carbon monoxide is 35 ppm (TWA).

Carbon monoxide is a widely spread air pollutant. It is a byproduct in the combustion of gasoline, diesel, kerosene and coal fuel, therefore, carbon monoxide may exist in different industries, residential areas and highways.

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. Carbon monoxide gas diffuses to the cells through the different diffusive resistances and reacts with the indicator layer, producing color change from light brown to brown to black. 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 brown 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. Prior to exposure, remove the protective strip from the first cell on the front of the badge.
5. For personnel monitoring, attach the badge near the user's breathing zone (i.e. collar) with the front side exposed to the surrounding atmosphere.
6. For area monitoring, attach the badge to a stand and mount in a centralized area with the front side exposed to the surrounding atmosphere.
7. Check the back side of the badge periodically to determine the exposure dose (ppm•hr).
8. To read the badge, locate the highest level cell with brown threshold color.
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 10 ppm•hr, the average concentration is determined by: $\frac{10 \text{ ppm}\cdot\text{hr}}{2 \text{ hr}}$ Therefore the average concentration is 5 ppm.

Storage

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

Benefits

1. Accurate Measurements: The ChromAir carbon monoxide monitor is designed to react selectively with carbon monoxide 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 carbon monoxide 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
Chlorine	Hydrogen sulfide	Methyl isobutyl ketone
Ethanol	Mercury	Ozone
2. ChromAir Color Comparators:

Ammonia	Hydrogen sulfide
Chlorine	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.

Table 1: Relative Humidity Correction

$$\text{Actual Exposure Dose} = \text{Observed Exposure Dose} \times \text{Correction Factor}$$

% Relative Humidity (RH)	Correction Factor	% Relative Humidity (RH)	Correction Factor
85	0.88	51	1.0
83	0.88	49	1.1
81	0.88	47	1.1
79	0.88	45	1.1
77	0.89	43	1.1
75	0.89	41	1.2
73	0.90	39	1.2
71	0.90	37	1.2
69	0.91	35	1.2
67	0.92	33	1.3
65	0.93	31	1.3
63	0.94	29	1.3
61	0.96	27	1.4
59	0.97	25	1.4
57	0.99	23	1.5
55	1.0	21	1.5
53	1.0	19	1.5

Table 2: Temperature Correction

$$\text{Actual Exposure Dose} = \text{Observed Exposure Dose} \times \text{Correction Factor}$$

Temperature		Correction Factor	Temperature		Correction Factor
°C	°F		°C	°F	
10	50	1.30	28	82	0.94
12	54	1.25	30	86	0.91
14	57	1.20	32	90	0.89
16	61	1.15	34	93	0.87
18	64	1.11	36	97	0.85
20	68	1.07	38	100	0.83
22	72	1.03	40	104	0.82
24	75	1.00	42	108	0.81
26	79	0.97	44	111	0.80