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



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**Operating Instructions For
Arsine, Diborane and Phosphine using the
Hydrides Monitor
(Part Number: 382037)**

Technical Summary

Physical Specifications:

Dimensions	(74 ± 1 mm) x (41 ± 1 mm) x (1 mm)
Weight	1.5 g
Refrigerated shelf life	1 year
Color change:	
Arsine	white to brown
Diborane	white to gray
Phosphine	white to gray

Sampling Parameters:

	Arsine	Diborane	Phosphine
Exposure dose:			
Badge	18 ppb·hr	5 ppb·hr	5 ppb·hr
Badge with comparator	18 - 1000 ppb·hr	4.0 - 500 ppb·hr	5.0 - 1000 ppb·hr
Minimum detectable limit (8 hrs)	2.25 ppb	0.6 ppb	0.6 ppb
Maximum rec. sampling time	1 day	1 day	1 day
Minimum rec. sampling time	15 minutes	15 minutes	15 minutes
Relative humidity range	10% - 90%	10% - 90%	10% - 90%
Face velocity range	5 - 168 cm/sec	5 - 168 cm/sec	5 - 168 cm/sec
Temperature range	50°F - 105°F	50°F - 105°F	50°F - 105°F
Light effect - UV (direct sunlight)	no effect	no effect	no effect
Light effect - visible	no effect	no effect	no effect
Color stability	24 hrs	24 hrs	24 hrs

Applications:

The SafeAir hydrides badge may be used for personnel or area monitoring for exposure times ranging from 15 minutes to one day. For higher resolution, the SafeAir hydrides badge may be used in conjunction with the SafeAir arsine color comparator (part number: 383011), the SafeAir diborane color comparator (part number: 383014) or the SafeAir phosphine color comparator (part number: 383012).

Cross Interferences:

Mercury, stibine and other hydrides are known interferences. Up to their respective PEL's, hydrogen sulfide and hydrogen selenide do not interfere. No other interferences are known.

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Introduction

Hydrides are defined as a compound of hydrogen with another more electropositive element or group. The SafeAir hydrides badge has been calibrated for three specific hydrides: Arsine, Diborane and Phosphine.

Arsine:

Arsine is a colorless, nonirritating toxic gas with a mild garlic odor. Exposure to a low dose by inhalation may cause the following symptoms within 2 to 24 hrs of exposure: weakness, fatigue, headache, drowsiness, confusion, shortness of breath, nausea, vomiting, and/or abdominal pain, jaundice and/or muscle cramps. Exposure to a large dose of arsine by any route may result in a loss of consciousness, convulsions, paralysis, respiratory failure, possibly leading to death. OSHA exposure limit for arsine is 0.05 ppm. NIOSH exposure limit for arsine is 0.002mg/m³ (ceiling). Arsine is most commonly used in the semiconductor and metal refining industries.

Diborane:

Diborane is a colorless gas at room temperature with a repulsive, sweet odor. Short-term exposure may cause a sensation of tightness of the chest, shortness of breath, cough and wheezing. These signs and symptoms can occur immediately or may be delayed for up to 24 hours. Exposure for long periods of time to low amounts of diborane may cause respiratory irritation, seizures, fatigue, drowsiness and confusion. The OSHA and NIOSH exposure limit for diborane is 0.1 ppm. Diborane is used as a reducing agent, rocket fuel, semiconductor dopant, catalyst and in organic synthesis.

Phosphine:

Phosphine is a colorless, flammable and toxic gas with an odor of garlic or decaying fish. Phosphine is a respiratory tract irritant that attacks primarily the cardiovascular and respiratory systems causing cardiac arrest, cardiac failure and pulmonary edema. Phosphine is used as a grain fumigant and as a rodenticide, OSHA exposure limit for phosphine is 0.3 ppm.

Principle of Operation

The SafeAir hydrides badge is a monitoring system designed to indicate the presence of arsine, diborane or phosphine at concentrations below the permissible exposure limit. The SafeAir hydrides badge detects the presence of arsine, diborane or phosphine by forming a color change in the shape of an exclamation mark inside the triangle. This indication is produced by a color-forming reaction, which occurs when the contaminant(s) react with a flat indicator layer. The SafeAir hydrides badge is a multi purpose badge.

Operating Instructions

1. Remove the pouch from the refrigerator and allow it to warm to room temperature.
2. Remove the badge from its protective pouch.
3. For personnel monitoring, attach the badge near the user's breathing zone (i.e. the collar) with the front side exposed to the surrounding atmosphere.
4. For area monitoring, attach the badge to a stand and mount in a centralized area with the front side exposed to the surrounding atmosphere.
5. The exclamation mark appears within the triangle when arsine, diborane or phosphines are present.
6. To obtain the average concentration, divide the exposure dose (ppb-hr) by the exposure time in hours (hr).

Storage

The SafeAir hydrides badge should be refrigerated in its sealed bag at all times.

Benefits

1. Accurate Detection: The SafeAir hydrides badge is designed to react selectively with hydrides with minimum interference from other substances.
2. Applications: The SafeAir badge may be used for personnel screening and for area monitoring or area mapping.
3. Ease of Use: The SafeAir badge is a direct-read device that gives immediate, on site results.

Other Available Monitors

1. SafeAir Badges:

Aniline	Formaldehyde	Ozone
Carbon Dioxide	Hydrazine	Phosgene
Carbon Monoxide	Hydrogen Chloride	Sulfur Dioxide
Chlorine	Hydrogen Sulfide	UDMH
Chlorine/Chlorine Dioxide	Mercury	
Dimethyl Amine	Nitrogen Dioxide	
2. SafeAir Color Comparators:

Carbon Dioxide	Hydrogen Chloride	Phosgene ext. range
Chlorine	MMH ²	TDI ³
Chloroformates ¹	Phosgene	UDMH
Hydrazine		

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

¹ To be used with the SafeAir phosgene badges

² To be used with the SafeAir hydrazine dual level badges

³ To be used with the SafeAir aromatic isocyanates badges