



# Gas Detector Tube Handbook



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# INTRODUCTION

This handbook describes the operation and technical specifications for Uniphos gas detector tubes and other specialty tubes. These high quality tubes have been used for many years.

Gas detection tubes were first developed in the early 1900's to measure carbon monoxide in the workplace atmosphere. Such tubes consist of a sealed glass tube containing reactive chemicals coated onto inert support particles. Unopened, these tubes can be stored for years ready for use. Once opened, a hand pump is used to draw an air sample through the tube, which changes color by reaction with the target compound in the air. The colored stain proceeds along the length of the tube and the gas concentration is measured by the final length of stain, using a pre-calibrated scale printed on the tube. Gas detection tubes provide a great advantage over more accurate but slow laboratory analyses by providing an immediate concentration measurement at low cost and without the need for calibration. Although a bit slower and less accurate than continuous on-site sensors such as PIDs, FIDs, and electrochemical sensors, tube readings offer the advantages of selectivity and sensitivity to some compounds these sensors cannot measure, and without calibration. Since their initial development, tubes for measuring over 300 gases and vapors have been produced.



# MEASUREMENT PROCEDURES

## DETECTION SYSTEM

The Uniphos precision gas detection system consists of two parts: 1) the detector tube and 2) the gas sampling pump. The sampling pump is used to draw a precise volume of air or other gas through the detector tube to determine the impurity gas or vapor concentration from the length of stain produced.

## CAUTION:

- The sampling pump and detector tube together form a measuring system. Combining the tube with pumps having different specifications than the Uniphos pump can result in considerable errors and should be avoided.
- Before each day's use, check the pump for leaks as described below. Failure to perform a leak check can result in dangerously low readings.
- The process of breaking open a tube can generate flying glass bits and leave the tube with sharp edges. Use eye and hand protection when opening tubes.
- Always consult the tube specification sheet for possible interferences. Failure to consider interferences can result in dangerously inaccurate readings.
- Keep tubes out of reach of unauthorized persons, especially children. Avoid contact with the tube contents if accidentally broken, as this can result in health hazards.
- Dispose of used tubes according to local regulations. Active ingredients are listed on the tube specification sheet in each box of tubes.

## DETECTOR TUBES

Figure 1 shows the key parts of a Uniphos gas detector tube. The printing on the tube includes the compound identity, the pre-calibrated concentration scale, the sample volume required, and the gas flow direction. The tubes come packaged 12 to a box with fluted cardboard protection and a detailed tube specification & instruction sheet inside. The label on the outside of the box lists brief operating parameters, batch number and the expiration date. For double tubes,

each box contains 6 pretreatment tubes and 6 measurement tubes for a total of 6 measurements per box.

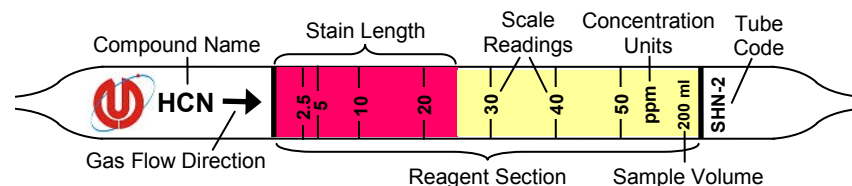


Figure 1. Key Features of Uniphos Gas Detector Tubes.

## Tube Storage

Tubes should be stored in a cool, dry, dark place if possible. Tubes stored at room temperature will last for the shelf life indicated on the tube sheet. However, to ensure freshness we recommend storage in a refrigerator at 39-45°F (4-7°C). Storing tubes below freezing is not necessary and in a few cases can damage them, and therefore is not recommended.

## Tube Instruction Sheet

Each box contains a tube sheet with details of the tube specifications and brief operating instructions. See the section TUBE SPECIFICATION SUMMARIES for details on the tube sheets. Be sure to thoroughly familiarize yourself with the tube operating parameters and possible interferences before beginning any measurements.

## ASP-21 PRECISION HAND PUMP OPERATION

An overview of the ASP-21 hand pump is shown in Figure 2. This is a piston-and-barrel type pump, that can draw up to 100-mL samples and is capable of holding a strong vacuum. For measurement, a detector tube with both ends open is inserted into the rubber tube connector (rubber inlet) at the end of the barrel. When the piston is withdrawn by pulling the handle, sample gas is slowly (1-3 minutes) drawn through the tube and into the barrel. The different parts of the ASP-21 gas sampling pump are described in more detail in the following sections.

## Tube Tip Cutter

The tube tip cutter is provided on the pump to break off both ends of the detector tube before it is inserted into the pump. To break the tip,

insert it into the cutter hole and bend the tube to one side (Figure 3).  
The broken

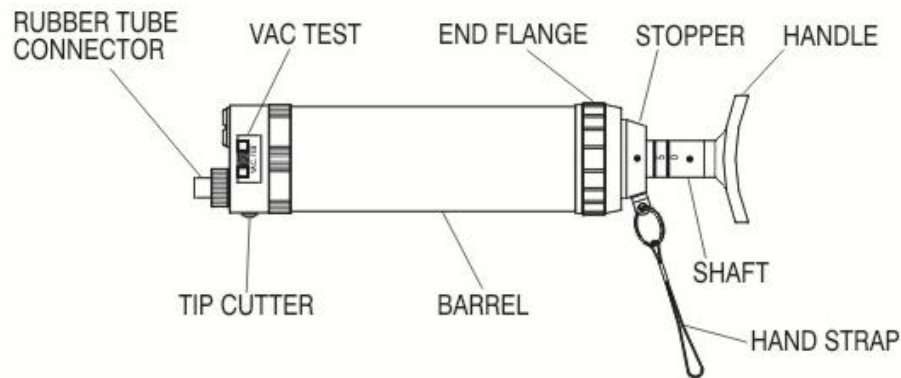


Figure 2. ASP-21 Precision Gas Sampling Hand Pump.

tips are collected in a storage space (Figure 4), which can be emptied by opening the rubber cap on the opposite side.

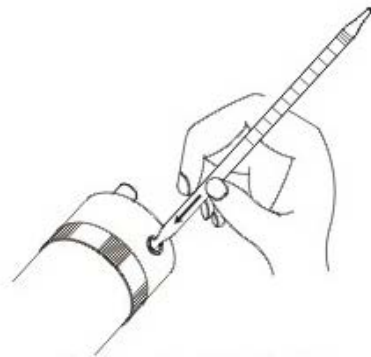


Figure 3. Tube Tip Cutting.

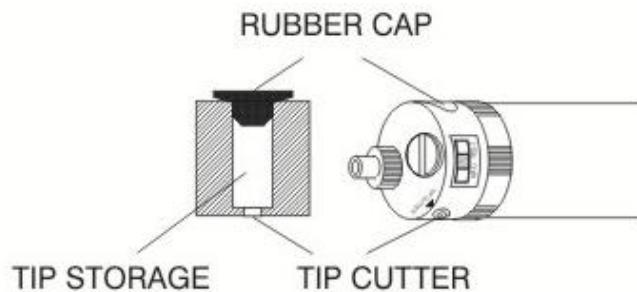


Figure 4. Tube Tip Cutter and Reservoir.

**CAUTION:**

- Hold the tube close to the end being broken to prevent the tube from breaking in the middle.
- Wear eye and hand protection when breaking open tubes to guard against bits of flying glass and sharp edges.

**Tube Insertion**

Insert the open tube into the rubber inlet connector on the pump as shown in Figure 5, ensuring that the arrow on the tube points towards the pump. Hold the tube close to the end being inserted to avoid breakage. Twisting the tube slightly while inserting helps ensure a good seal. In the case of a double tube, first connect the pre-tube with the measurement tube with the ⊗ marks together (Figure 6), and then insert the measurement tube into the hand pump inlet.

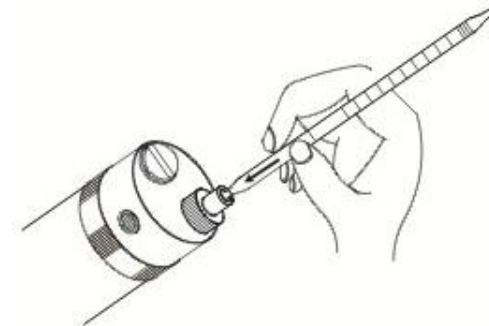


Figure 5. Inserting a Tube

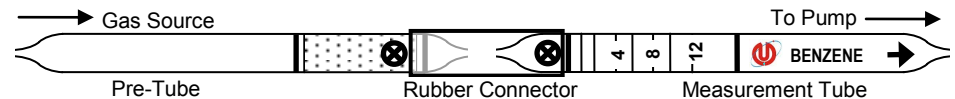


Figure 6. Double Tube Connections

**Volume Selection and Sample Drawing**

The ASP-21 pump has markings on the shaft indicating the volume drawn. By aligning the red dots on the stopper assembly and shaft (Figure 7), the pump can be made to latch at either the 50 mL (1/2 stroke) or 100 mL (full stroke) positions. To do this, first look up the

proper sample volume on the Tube Sheet or on the tube itself. Align the red dots, insert the tube into the sample gas, pull the shaft slightly past the 50 mL or 100 mL marks until a click is heard, and release the handle (Figure 8). The vacuum in the barrel will draw the piston back to the latching 50 or 100 mL position.

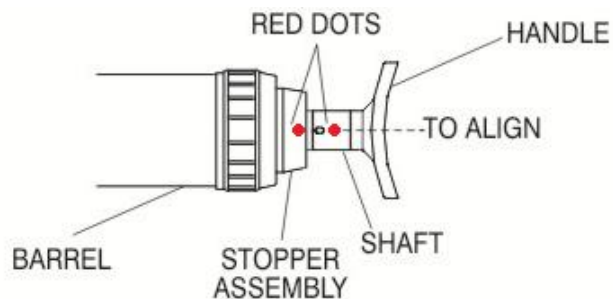


Figure 7. Volume-latching Stopper Assembly.

Keep the end of the tube in the sample gas source while the gas is being drawn through the tube for the allotted sampling time (approximately 1-3 minutes) as indicated on the Tube Sheet. The end of sampling is also indicated by observing the “Vac. Test” indicator as described below.



Figure 8. Drawing a Sample

For larger sample volumes (200 mL or more), rotate the handle by 90°, and push the shaft back into the pump starting position without removing the tube. The pump has an internal check valve that allows the spent gas to escape out the back instead of being forced back

through the tube. Then re-align the red dots and draw a second stroke in the same manner as the first. Repeat for additional strokes.

### Vacuum Test (End-of-Flow Indicator)

The Vacuum Test indicator is used to test the pump for leaks as well as to see the completion of gas sampling. When the shaft is drawn and the pump barrel is under vacuum, the red indicator moves to the “Beginning” position shown in Figure 9. When the barrel is full of gas, the red indicator moves to the “End” position, indicating that flow through the tube is done.

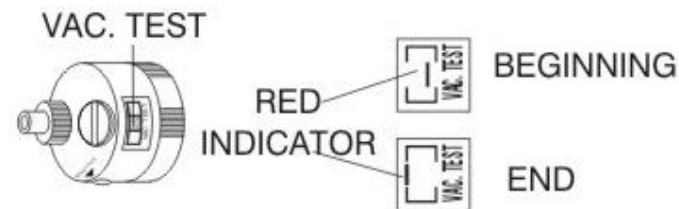


Figure 9. Vacuum Test Indicator.

### HAND PUMP LEAK CHECK

The hand pump should be checked for leaks before each day’s use, or before each series of critical measurements, using the following procedure:

- Insert a new, *unopened* tube into the inlet tube connector.
- Align the red dots and pull the pump handle one full stroke.
- Wait 3 minutes and release the pump handle by rotating it 90° left or right and allow the piston to come back while holding the handle. CAUTION: keep a little resistance on the handle to prevent the piston from snapping back suddenly and possibly damaging the pump.
- If the piston returns completely (within 1-2 mm) of its original position, it is free of leaks and ready for use. If it does not, the pump has leaks. Troubleshoot as described in the next section under Maintenance.

We recommend that a leak check also be performed when switching to tubes for a different test chemical. Because different types of tubes are designed with slightly varying diameters, a leak check performed on one kind of tube may not give the same result as another kind tube.

## HAND PUMP MAINTENANCE

The ASP-21 hand pump needs occasional maintenance.

### 3.1 Greasing the Barrel and Replacing the Plunger Gasket

If the pump leaks, or the piston action is too stiff or loose, it may require internal re-greasing and/or replacement of the plunger gasket:

- Unscrew the end flange and pull out the piston as in Figure 10.

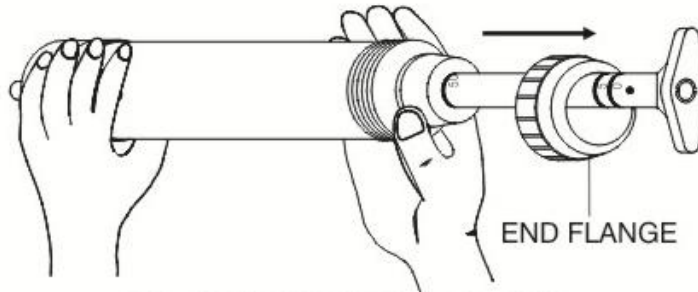


Figure 10. Removing the Piston.

- Wipe off the piston and the inside surface of the barrel.
- Inspect the piston gasket on the end of the plunger for damage and replace as necessary. To replace the gasket, use a small screwdriver or other sharp object to lift off the worn gasket, and slip a new gasket into the groove.
- Apply fresh grease to the piston gasket and the inside of the barrel.
- Push the piston back into the barrel and tighten the flange.

### 3.2 Replacing the Inlet Rubber Tube Connector

If the rubber tube connector is worn, it may cause leaks. Unscrew the connector holder and replace the connector.

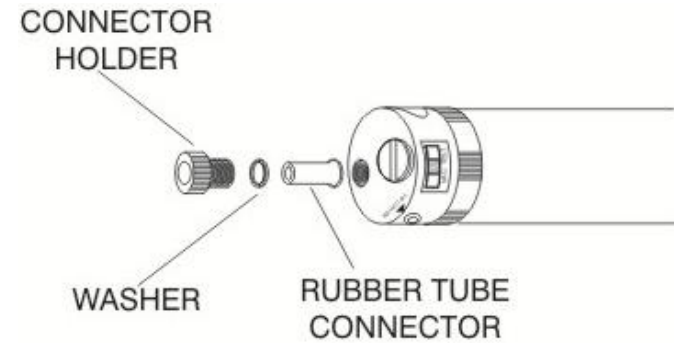


Figure 11. Inlet Rubber Tube Connector Assembly.

### 3.3 Pump Troubleshooting Summary

In case of a leaking pump, the following should be checked for possible replacement or correction.

Symptom/Cause	Corrective Action
<ul style="list-style-type: none"> <li>• Rubber tube connector is loose.</li> <li>• Pump Leaks. Rubber tube connector is worn or damaged.</li> <li>• Pump Leaks. Piston sticks or slips too easily.</li> <li>• Pump leaks because internal check valve leaks.</li> </ul>	<ul style="list-style-type: none"> <li>• Tighten connector holder.</li> <li>• Replace the inlet tube connector.</li> <li>• Clean and re-grease the inside of the barrel and/or replace piston gasket.</li> <li>• Replace Pump</li> </ul>

## READING TUBES

- Read the concentration of the test compound directly from the length of stain using the scale printed on the tube.
- In case the stain endpoint is diffuse, read the midpoint of the diffuse section (from full color to the point where the color just becomes visible).
- In case the stain endpoint is slanted, read the midpoint between the shortest and longest stain lengths.

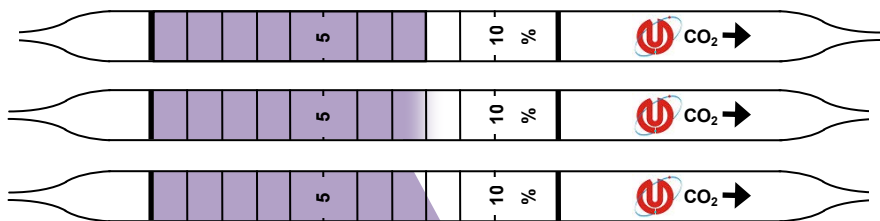


Figure 12. Three possible tube endpoints all reading 8%

- Read the tubes immediately (within a few minutes) after sampling, as stains may fade or spread with time.
- If the sample volume was different from the standard number of pump strokes, multiply the reading by the volume correction factor (VCF or  $CF_V$ ) listed on the tube sheet, to obtain the true concentration.
- If humidity or temperature corrections are needed as indicated on the tube sheet, multiply the reading by the humidity correction factor (HCF or  $CF_H$ ) or the temperature correction factor (TCF or  $CF_T$ ) listed.
- If the tube is used to measure a cross-sensitive compound (e.g., measuring ammonia using the amines tube), multiply the reading by the compound correction factor (XCF or  $CF_X$ ).
- For pressure corrections, see Appendix I. These are uncommon.
- If multiple correction factors are applicable, multiply by all of them. For example, if volume, temperature, and cross-sensitivity factors apply, multiply the observed reading by  $CF_V \times CF_T \times CF_X$  to obtain the true reading. **CAUTION:** Tube accuracy is decreased when correction factors are used.
- Check the tube sheet for possible interferences and be sure to understand which of these may be present in the sampled gas. Interferences can cause readings to be either high or low.

## SUMMARY OF MEASUREMENT PROCEDURES

1. Open both ends of the tube using the tip breaker on the sampling pump.
2. Insert one end of the tube securely into the sampling pump inlet, ensuring that the direction-of-flow arrow on the tube points towards the pump.

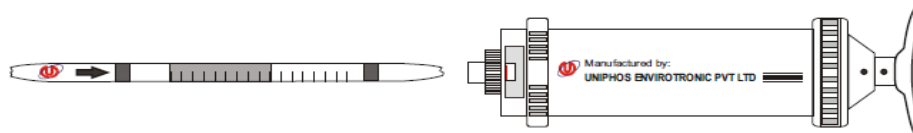


Figure 13. Tube and Pump Connection

3. In case of a double tube, first connect the two tubes using the rubber tubing connector. The  $\otimes$  marks on each tube indicate the ends that should be inserted into the connector.
4. Insert the measurement tube securely into the sampling pump inlet, ensuring that the direction-of-flow arrow on the tube points towards the pump.
5. Rotate the piston shaft until with the red dot on it aligns with the red dot on the pump body.
6. Insert the open end of the tube(s) into the gas to be sampled and pull the handle 0.5 or 1 stroke until it locks in place, and wait for the sampling time indicated. The end-of-flow indicator (Vac. Test) near the inlet of the pump also shows when sampling is complete. For a second stroke, rotate the handle 90°, push it back to the 0 mark without removing the detector tube, and pull the piston handle for another full stroke. Repeat for additional strokes.
7. Remove the tube from the pump and read the concentration directly on the tube scale. If tailing occurs read the midpoint of the stain end. For accuracy the tube should be read within a few minutes of sampling.
8. Multiply the reading by any applicable correction factors for sample volume, temperature, humidity, and/or compound type.
9. Check for possible cross-sensitivities that may have affected the readings.

# ACCURACY & QUALITY CONTROL

## ASP-21 HAND PUMP

All hand pumps are tested by hydraulic displacement to within  $\pm 2\%$  accuracy of the 100 mL standard volume for one pump stroke.

## DETECTOR TUBES

Uniphos uses strict Quality Control Procedures to ensure accurate calibration of the tubes. Each batch is individually calibrated and silkscreened. Gas and vapor standards are prepared by a variety of methods including dilution of pure (100%) gas or liquid, dilution of certified standards purchased from an independent supplier, diffusion tubes, and electrochemical methods. Calibration concentrations for each batch are verified in Uniphos' Quality Assurance analytical laboratory using gas chromatography or wet chemical methods. In this way, standard concentrations are established for each batch by four different methods: 1) calculation from the known amount of dilution, 2) measurement in the QA lab, 3) measurement using a competitor's tubes, and 4) measurement with earlier batches of Uniphos tubes kept in cold storage. All tubes (except water vapour) are calibrated at a gas humidity of 50% RH in a temperature-controlled room at 20°C (68°F).

### Uniphos Tube Accuracy

All Uniphos tubes have an accuracy of  $\pm 10\%$  at the time of calibration. End users may find a wider variation because of differences in temperature, humidity, presence of interferences, sampling errors, user sampling time, and user storage conditions. In any case, all tubes meet the  $\pm 25\%$  accuracy level accepted for gas detection tubes. Note that accuracy is reduced when using correction factors for extended ranges and cross-sensitive gases, etc.

### Batch Uniformity

In order to ensure uniformity within a given batch, tube inner diameter must be strictly controlled. Uniphos uses only tubes that are within 0.05 mm (50  $\mu\text{m}$ ) of each other to make sure that all tubes in a batch have the same stain length.

# TUBE SPECIFICATION SUMMARIES

**Note:** The data in the following Specification Summaries are mostly provided by Uniphos. However, in some cases Uniphos has added or modified data arising from various sources including field data and our own laboratory tests. Such data are accurate to the best of our knowledge, but may not have been verified or endorsed by Uniphos.

These Specification Summaries provide an overview of the available technical information. A complete tube sheet is provided in each box of tubes. Before commencing any measurements, always read the entire tube sheet and familiarize yourself with the tube operation.

## EXPLANATION OF TUBE SPECIFICATION SHEETS

### Standard and Extended Ranges

The tube sheet shows the standard range plus up to two extended ranges. The standard range is the scale printed on the tube and uses the standard sample volume and number of pump strokes. When the standard sample volume is used, the concentration is read directly from the printed scale. When the sampling volume is extended, the user must multiply the readings obtained by the volume correction factor ( $VCF$  or  $CF_V$ ) to obtain the true concentration. For example, if an Acetone SAC-5 tube is used in the extended range of 4 pump strokes ( $CF_V = 0.5$ ) instead of the standard 2 strokes and a reading of 1000 ppm is equivalent to  $1000 \times 0.5 = 500$  ppm true concentration.

### Sampling Time

This is the time expected to complete sampling when the tube is used in air. The Vacuum Test indicator should come to its end position in approximately this time. To ensure complete sampling, one can wait an additional 10-15 seconds to allow for variations in the Vac. Test indicator with age and use. However, do not wait for more than a few minutes after sampling is complete to read the tube, because changes can gradually occur in the intensity and length of stain.

Sampling times are different in other matrix gases and are faster when the gas is less viscous. For example, hydrogen and methane have only about half the viscosity of air, and therefore measurements in these gases are about twice as fast. Specific examples include the measurement of CO in pure hydrogen and water vapor in natural gas.

### Color Change

This is the color change expected when the target gas is detected. If a different color is observed, it indicates that an interfering compound is responding, or that the tubes are past expiration.

### Shelf Life

This is the usable life of the tube when stored at room temperature. Tube freshness can be preserved by storing in a refrigerator.

**CAUTION:** Do not use tubes beyond their expiration date. Readings taken with expired tubes can be dangerously low or high.

### Active Reagents

The active reagents are listed to help understand possible interferences and to aid in disposal of waste tubes.

### Temperature and Humidity Effects

Nearly all Uniphos tubes are calibrated at 20°C (68°F) and 50% relative humidity. Any correction factors for other conditions are listed and should be multiplied by the readings along with any volume or chemical correction factors. The humidity refers to the humidity of the sample gas rather than the ambient humidity. For example, in natural gas sampling the outside air humidity is not relevant and it is typically much higher than that of the gas. The temperature used for corrections should be the final temperature of the tube following sampling. Because this temperature is usually not easy to determine, it can be estimated (for a one-stroke tube) as the average of the gas temperature and the initial tube temperature before sampling. Thus, for example, if the tube response is affected by cold, keeping it in a warm shirt pocket until just before measurement can help minimize corrections and improve accuracy in cold weather.

### Cross-sensitivities

Cross-sensitive compounds may interfere in target gas measurements; conversely, the tube may be used to measure some of these compounds. For example, amines can be measured accurately on ammonia tubes by applying correction factors. Interference can be positive or negative. For example,  $NH_3$  reduces the response of  $SO_2$  measurements without giving a color change by itself. The user should know as much about the sample gas as possible in order to assess possible interferences. Unusual colors or stain patterns suggest that interferences are present.

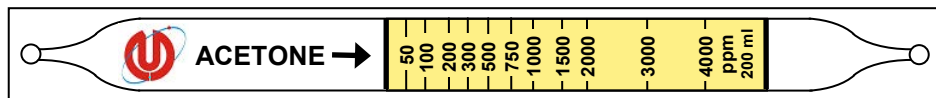
# Acetone $C_3H_6O$

TWA (TLV): 500 ppm

STEL (TLV): 750 ppm

Flammable Range: 3-13%

## SAC-5



	Extended	Standard	Extended
<b>Measurement Range</b>	25-2000 ppm	50-4000 ppm	100-8000 ppm
<b>No. of Pump Strokes</b>	4 (400 mL)	2 (200 mL)	1 (100 mL)
<b>Correction Factor (CF<sub>v</sub>)*</b>	0.5	1.0	2.0
<b>Sampling Time</b>	1.5 minutes per pump stroke		
<b>Color Change</b>	Yellow → Light Red		
<b>Shelf Life</b>	1 year (Refrigeration at ≤45°F (≤7°C) required)		
<b>Active Reagent(s)</b>	Hydroxylamine phosphate		

\* Multiply the observed reading by the correction factor (CF<sub>v</sub>) to obtain the true concentration.

### TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 10-90% RH.

### CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response
Methyl ethyl ketone	6200	≤50
Methyl isobutyl ketone	10000	0
CH <sub>4</sub>	25000	0
CO	14800	0
CO <sub>2</sub>	15000	0
NH <sub>3</sub>	50000	Over-range
H <sub>2</sub> S	300	0
Ethyl acetate	10000	100
Isobutylene	2000	0
n-Hexane	2400	0
Toluene	400	0

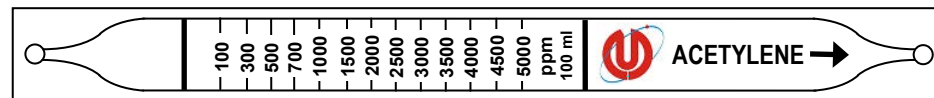
# Acetylene $HC\equiv CH$

TWA (TLV): NA

Ceiling (REL): 2500 ppm

Flammable Range: 2-81%

## SAL-5



	Extended	Standard	Extended
<b>Measurement Range</b>	Do not extend	100-5000 ppm	Do not extend
<b>No. of Pump Strokes</b>		1 (100 mL)	
<b>Correction Factor (CF<sub>v</sub>)</b>		1.0	
<b>Sampling Time</b>	1 minute per pump stroke		
<b>Color Change</b>	White → Brown with green end		
<b>Shelf Life</b>	1 year		
<b>Active Reagent(s)</b>	Iodine pentoxide		

### TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 10-90% RH.

### CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	Comments
CH <sub>4</sub>	50000	0	
NO <sub>2</sub>	1000	<10	
SO <sub>2</sub>	100	<10	Diffuse
Isobutylene	106	<10	Diffuse
n-Hexane	115	≥5000	Diffuse
Toluene	100	<10	Diffuse

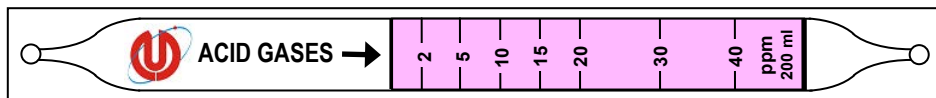
# Acid Gases

TWA (TLV): NA

STEL (TLV): NA

# SAG-2

Flammable Range: NA



Range Class	Extended	Standard	Extended
Measurement Range	1-20 ppm	2-40 ppm	4-80 ppm
No. of Pump Strokes	4 (400 mL)	2 (200 mL)	1 (100 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2.0
Sampling Time	1 minute per pump stroke		
Color Change	Purple → Yellow		
Shelf Life	1 year		
Active Reagent(s)	Acid/base pH change		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 10-90% RH.

## CROSS-SENSITIVITIES:

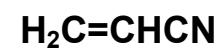
Compound	Conc. (ppm)	Apparent Response	CF <sub>X</sub> *	Comments
Acetic Acid <sup>†</sup>			1.0	Yellow
HCl	116	20	5.8	Pink with yellow
HNO <sub>3</sub>	40	6	6.6	Pink with yellow
NO <sub>2</sub>	38	20	1.9	Yellow
Cl <sub>2</sub>	14	24	0.6	White
I <sub>2</sub>	36	40	0.9	Greenish gray
SO <sub>2</sub>	12	40	0.3	Yellow

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>X</sub>) to obtain the true concentration.

<sup>†</sup> The tubes are calibrated with acetic acid.

# Acrylonitrile

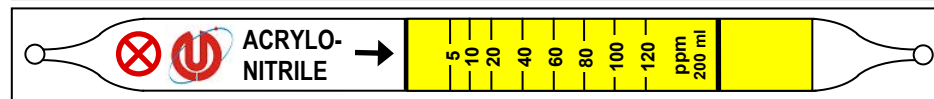
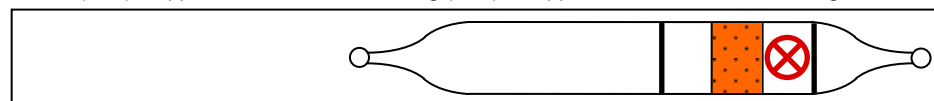
TWA (TLV): 2 ppm



Ceiling (TLV): 10 ppm

# SAN-4L

Flammable Range: 3-17%



Range Class	Extended	Standard	Extended
Measurement Range	Do not extend	5-120 ppm	Do not extend
No. of Pump Strokes		2 (200 mL)	
Correction Factor (CF <sub>V</sub> )*		1.0	
Sampling Time	1 minute per pump stroke		
Color Change	Yellow → Purple		
Shelf Life	1 year		
Active Reagent	Chromium trioxide, Mercuric chloride		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F) and 50% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response
HCl	40	<1
Toluene	100	0
Methanol	200	0
Acetone	1000	0

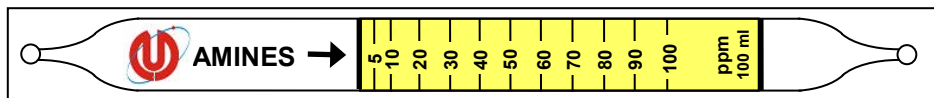
# Amines RNH<sub>2</sub> (CH<sub>3</sub>NH<sub>2</sub>)

TWA (TLV): 5 ppm (CH<sub>3</sub>NH<sub>2</sub>)

STEL (TLV): 15 ppm

Flammable Range: 5-21%

## SMA-3



Range Class	Extended	Standard	Extended
Measurement Range	2.5-50 ppm	5-100 ppm	10-200 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2.0
Sampling Time	1 minute per pump stroke		
Color Change	Yellow → Blue		
Shelf Life	1 year		
Active Reagent(s)	Acid/base pH change		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

### TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

### CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>X</sub> *	TWA (TLV) (ppm)	Comments
Trimethylamine	2-34		0.34	5	Light green
Triethylamine	2-43		0.43	1	
Isopropylamine	3-64		0.64	5	
Diethylamine	3-65		0.65	5	
Ethylamine	4-85		0.85	5	
NH <sub>3</sub>	5-90		0.89	25	
Methylamine	5-100		1.0	5	
n-Butylamine	5-100		1.0	C5	
Cyclohexylamine	7-130		1.3	10	
Pyridine	11	≤3			
CO	500	0			
H <sub>2</sub> S	100	0			
HCl	1000	0			
Isobutylene	106	0			

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>X</sub>) to obtain the true concentration.

Note: Ethanolamine can be measured using 3 pump strokes and a CF<sub>X</sub> of 3.7.

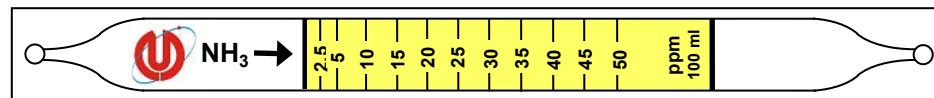
# Ammonia NH<sub>3</sub>

TWA (TLV): 25 ppm

STEL (TLV): 35 ppm

Flammable Range: 15-28%

## SAM-2



Range Class	Extended	Standard	Extended
Measurement Range	1.25-25 ppm	2.5-50 ppm	5-100 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2.0
Sampling Time	1 minute per pump stroke		
Color Change	Yellow → Blue		
Shelf Life	2 years		
Active Reagent(s)	Acid/base pH change		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

### TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

### CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>X</sub> *	Comments
Diethylamine	10.4	20	0.52	Blue ring
CO	100	≤1		
CO <sub>2</sub>	20000	2.5		
H <sub>2</sub> S	200	0		
SO <sub>2</sub>	100	0		
Isobutylene	106	0		
n-Hexane	100	0		
Toluene	100	≤1		Ring

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>X</sub>) to obtain the true concentration.

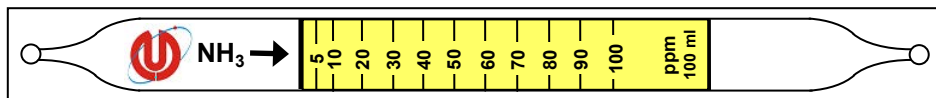
# Ammonia NH<sub>3</sub>

TWA (TLV): 25 ppm

STEL (TLV): 35 ppm

Flammable Range: 15-28%

# SAM-3



Range Class	Extended	Standard	Extended
Measurement Range	2.5-50 ppm	5-100 ppm	10-200 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>v</sub> )*	0.5	1.0	2.0
Sampling Time	1.5 minutes per pump stroke		
Color Change	Yellow → Blue		
Shelf Life	3 years		
Active Reagent(s)	Acid/base pH change		

\* Multiply the observed reading by the correction factor (CF<sub>v</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>x</sub> *	Comments
n-Butylamine	114	114	1.0	
Diethylamine	50	70	0.7	
CH <sub>4</sub>	50000	≤1		Ring
CO	250	≤1		Blue ring
CO <sub>2</sub>	50000	0		
H <sub>2</sub> S	100	0		
NO <sub>2</sub>	200	5		
SO <sub>2</sub>	100	0		
Isobutylene	106	0		
n-Hexane	100	0		
Toluene	100	≤1		Ring

\* Multiply the observed reading by the correction factors (CF<sub>v</sub>•CF<sub>x</sub>) to obtain the true concentration.

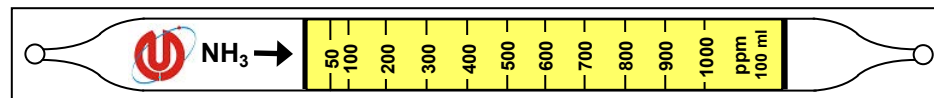
# Ammonia NH<sub>3</sub>

TWA (TLV): 25 ppm

STEL (TLV): 35 ppm

Flammable Range: 15-28%

# SAM-4



Range Class	Extended	Standard	Extended
Measurement Range	25-500 ppm	50-1000 ppm	100-2000 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>v</sub> )*	0.5	1.0	2.0
Sampling Time	0.5 minutes per pump stroke		
Color Change	Yellow → Blue		
Shelf Life	3 years		
Active Reagent(s)	Acid/base pH change		

\* Multiply the observed reading by the correction factor (CF<sub>v</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F) and 50% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>x</sub> *	Comments
n-Butylamine	301	300	1.0	
Diethylamine	100	200	0.5	
CO	250	0		
CO <sub>2</sub>	50000	0		

\* Multiply the observed reading by the correction factors (CF<sub>v</sub>•CF<sub>x</sub>) to obtain the true concentration.

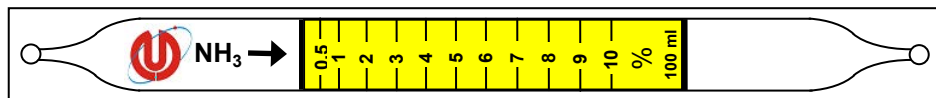
# Ammonia NH<sub>3</sub>

TWA (TLV): 25 ppm

STEL (TLV): 35 ppm

Flammable Range: 15-28%

# SAM-8M



Range Class	Extended	Standard	Extended
Measurement Range	0.25-5%	0.5-10%	1-20%
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2.0
Sampling Time	1 minute per pump stroke		
Color Change	Yellow → Blue		
Shelf Life	3 years		
Active Reagent(s)	Acid/base pH change		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F) and 50% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response
CO	3000	0
CO <sub>2</sub>	10%	0
NO	100	0

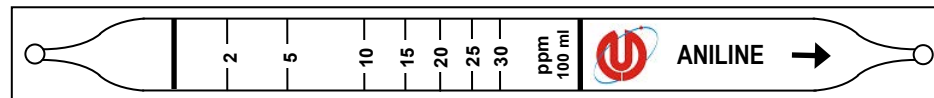
# Aniline C<sub>6</sub>H<sub>5</sub>NH<sub>2</sub>

TWA (TLV): 2 ppm

STEL (TLV): NA

Flammable Range: 1-11%

# SAI-2



Range Class	Extended	Standard	Extended
Measurement Range	Do not extend	2-30 ppm	Do not extend
No. of Pump Strokes		1 (100 mL)	
Correction Factor (CF <sub>V</sub> )*		1.0	
Sampling Time	0.5 minute per pump stroke		
Color Change	White → Yellow		
Shelf Life	1 year		
Active Reagent(s)	p-Dimethylaminobenzaldehyde		

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F) and 50% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response
Diethylamine	10	0
NH <sub>3</sub>	70	0
H <sub>2</sub> S	200	0

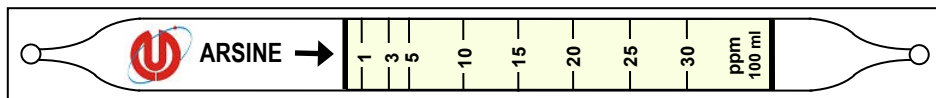
# Arsine AsH<sub>3</sub>

TWA (TLV): 0.005 ppm

Ceiling (REL): 0.002 mg/m<sup>3</sup>

Flammable Range: 5-78%

# SAR-2



Range Class	Extended	Standard	Extended
Measurement Range	0.5-15	1-30 ppm	1-60 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2.0
Sampling Time	1 minute per pump stroke		
Color Change	Off White → Purple		
Shelf Life	2 years		
Active Reagent(s)	Gold Compound		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F) and 50% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>X</sub> *	Comments
PH <sub>3</sub>	10	10	1.0	Very faint
NH <sub>3</sub>	100	1		Diffuse edge
H <sub>2</sub> S	25	4		Very faint
CO	100	0		
SO <sub>2</sub>	200	0		
Toluene	100	0		

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>X</sub>) to obtain the true concentration.

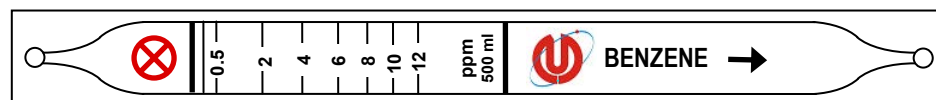
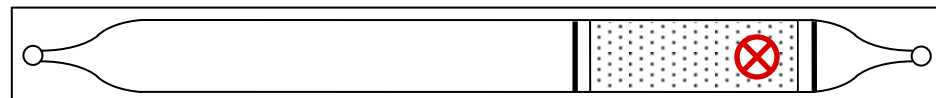
# Benzene C<sub>6</sub>H<sub>6</sub>

TWA (TLV): 0.5 ppm

STEL (TLV): 2.5 ppm

Flammable Range: 1-8%

# SBE-2L



Range Class	Extended	Standard	Extended
Measurement Range	Do not extend	0.25-12 ppm	Do not extend
No. of Pump Strokes		5 (500 mL)	
Correction Factor (CF <sub>V</sub> )*		1.0	
Sampling Time	2.5 minutes per pump stroke		
Color Change	White → Brownish green		
Shelf Life	2 years		
Active Reagent(s)	Iodine pentoxide		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	Comments
CH <sub>4</sub>	25000	0	
CO	10	0	
H <sub>2</sub> S	25	12	Brown ring
Isobutylene	106	0	
Toluene	100	Over	Above scale range
Xylenes	70	0	
Xylenes	140	1	
Styrene	50	0	

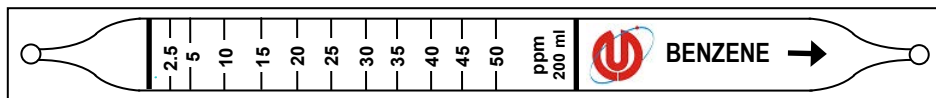
# Benzene C<sub>6</sub>H<sub>6</sub>

TWA (TLV): 0.5 ppm

STEL (TLV): 2.5 ppm

Flammable Range: 1-8%

# SBE-2



Range Class	Extended	Standard	Extended
Measurement Range	1.25-25 ppm	2.5-50 ppm	5-100 ppm
No. of Pump Strokes	4 (400 mL)	2 (200 mL)	1 (100 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2.0
Sampling Time	2.5 minutes per pump stroke		
Color Change	White → Brownish green		
Shelf Life	3 years		
Active Reagent(s)	Iodine pentoxide		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	Comments
Isobutylene	106	0	
Toluene	25	10	
n-Octane	100	0	
CO	50	0	
H <sub>2</sub> S	25	35	Brown ring
NO	100	0	

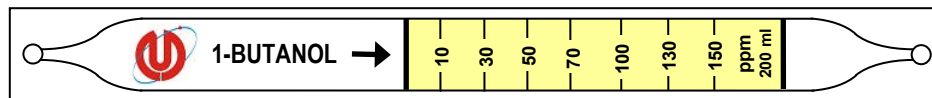
# 1-Butanol C<sub>4</sub>H<sub>9</sub>OH

TWA (TLV): 20 ppm

STEL (TLV): NA

Flammable Range: 1-11%

# SNB-4L



Range Class	Extended	Standard	Extended
Measurement Range	Do not extend	10-150 ppm	20-300 ppm
No. of Pump Strokes		2 (200 mL)	1 (100 mL)
Correction Factor (CF <sub>V</sub> )*		1.0	2.0
Sampling Time	2.5 minutes per pump stroke		
Color Change	Yellow → Pale green		
Shelf Life	2 years		
Active Reagent	Chromium (VI) compound		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>X</sub> *	Comments
2-Butanol	70	79	0.9	
Methanol	200	130	1.5	
Acetone	100	0		
H <sub>2</sub> S	50	0		
n-Hexane	125	0		
Benzene	37	0		

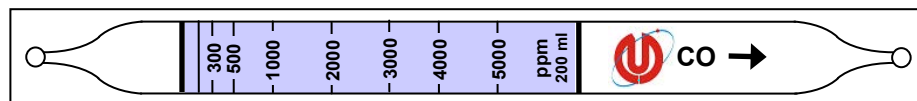
\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>X</sub>) to obtain the true concentration.

# Carbon Dioxide $\text{CO}_2$ SCD-5

TWA (TLV): 5000 ppm

STEL (TLV): 30,000 ppm

Flammable Range: NA



Range Class	Extended	Standard	Extended
<b>Measurement Range</b>	150-2500 ppm	300-5000 ppm	600-10000 ppm
<b>No. of Pump Strokes</b>	4 (400 mL)	2 (200 mL)	1 (100 mL)
<b>Correction Factor (<math>\text{CF}_V</math>)*</b>	0.5	1.0	2.0
<b>Sampling Time</b>	3.5 minutes per pump stroke		
<b>Color Change</b>	Blue → Off white		
<b>Shelf Life</b>	3 years		
<b>Active Reagent(s)</b>	Sodium hydroxide		

\* Multiply the observed reading by the correction factor ( $\text{CF}_V$ ) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 10-90% RH.

Temperature:	39°F	68°F	84°F	111°F
<b>Correction Factor (<math>\text{CF}_T</math>):</b>	0.9	1.0	1.1	1.2
<b>Temperature:</b>	4°C	20°C	29°C	44°C

\* Multiply the observed reading by the correction factors ( $\text{CF}_V \cdot \text{CF}_T$ ) to obtain the true concentration.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response
CO	3000	0
$\text{NH}_3$	50000	0
NO	100	0
$\text{NO}_2$	200	0
$\text{SO}_2$	2050	0
Isobutylene	106	0
n-Hexane	1500	0
Toluene	400	0

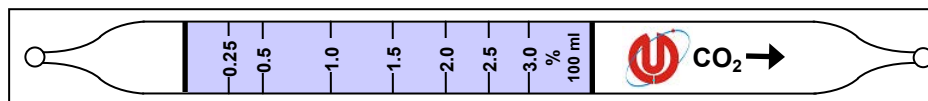
Acid gases such as HCl give a positive response when co-existing.

# Carbon Dioxide $\text{CO}_2$ SCD-7

TWA (TLV): 5000 ppm

STEL (TLV): 30,000 ppm

Flammable Range: NA



Range Class	Extended	Standard	Extended
<b>Measurement Range</b>	0.125-1.5%	0.25-3%	0.5-6%
<b>No. of Pump Strokes</b>	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
<b>Correction Factor (<math>\text{CF}_V</math>)*</b>	0.5	1.0	2.0
<b>Sampling Time</b>	2 minutes per pump stroke		
<b>Color Change</b>	Blue → White		
<b>Shelf Life</b>	3 years		
<b>Active Reagent(s)</b>	Sodium hydroxide		

\* Multiply the observed reading by the correction factor ( $\text{CF}_V$ ) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	Comments
$\text{CH}_4$	2.5%	0	
CO	1.5%	≤0.1%	Color darkens
$\text{NH}_3$	5%	0	
NO	100	0	
$\text{H}_2\text{S}$	0.2%	0.5%	
$\text{SO}_2$	3.5%	1.1%	
Isobutylene	106	≤0.1%	Dark blue ring
n-Hexane	0.15%	0	
Benzene	100	≤0.1%	Dark blue ring
Toluene	400	0	

Acid gases such as HCl give a positive response when co-existing.

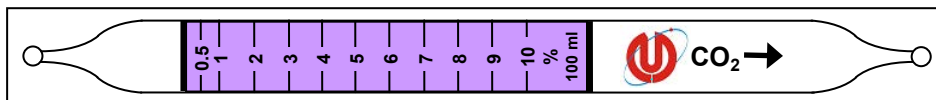
# Carbon Dioxide $\text{CO}_2$

TWA (TLV): 5000 ppm

STEL (TLV): 30,000 ppm

# SCD-8M

Flammable Range: NA



Range Class	Extended	Standard	Extended
Measurement Range	0.25-5%	0.5-10%	1-20%
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor ( $\text{CF}_V$ )*	0.5	1.0	2.0
Sampling Time	2.5 minutes per pump stroke		
Color Change	Purple → Off white		
Shelf Life	3 years		
Active Reagent(s)	Sodium hydroxide		

\* Multiply the observed reading by the correction factor ( $\text{CF}_V$ ) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 10-90% RH.

Temperature:	39°F	68°F	86°F	104°F
Correction Factor ( $\text{CF}_T$ ):	0.9	1.0	1.1	1.2
Temperature:	4°C	20°C	30°C	40°C

\* Multiply the observed reading by the correction factors ( $\text{CF}_V \cdot \text{CF}_T$ ) to obtain the true concentration.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	Comments
$\text{CH}_4$	2.5%	0	Color darkens whole tube
CO	1.5%	0	
$\text{H}_2\text{S}$	0.2%	0.5%	
$\text{SO}_2$	3.5%	1.1%	
Isobutylene	106	$\leq 0.1\%$	Dark blue ring
Benzene	100	$\leq 0.1\%$	Dark blue ring

Acid gases such as HCl give a positive response when co-existing.

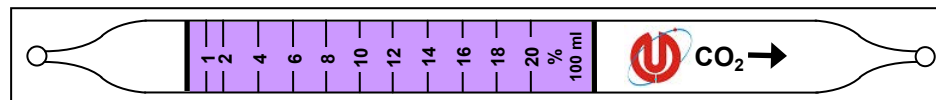
# Carbon Dioxide $\text{CO}_2$

TWA (TLV): 5000 ppm

STEL (TLV): 30,000 ppm

# SCD-8

Flammable Range: NA



Range Class	Extended	Standard	Extended
Measurement Range	0.5-10%	1-20%	2-40%
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor ( $\text{CF}_V$ )*	0.5	1.0	2.0
Sampling Time	2.5 minutes per pump stroke		
Color Change	Purple → Off white		
Shelf Life	3 years		
Active Reagent(s)	Sodium hydroxide		

\* Multiply the observed reading by the correction factor ( $\text{CF}_V$ ) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 10-90% RH.

Temperature:	39°F	68°F	86°F	104°F
Correction Factor ( $\text{CF}_T$ ):	0.9	1.0	1.1	1.2
Temperature:	4°C	20°C	30°C	40°C

\* Multiply the observed reading by the correction factors ( $\text{CF}_V \cdot \text{CF}_T$ ) to obtain the true concentration.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	Comments
$\text{CH}_4$	2.5%	0	Color darkens whole tube
CO	1.5%	$\leq 0.1\%$	
$\text{NH}_3$	300	0	
NO	100	0	
$\text{H}_2\text{S}$	100	0	
$\text{H}_2\text{S}$	0.2%	0.5%	
$\text{SO}_2$	200	0	
$\text{SO}_2$	3.5%	1.1%	
Isobutylene	106	$\leq 0.1\%$	Dark blue ring
n-Hexane	1200	0	
Benzene	100	$\leq 0.1\%$	Dark blue ring
Toluene	100	0	

Acid gases such as HCl give a positive response when co-existing.

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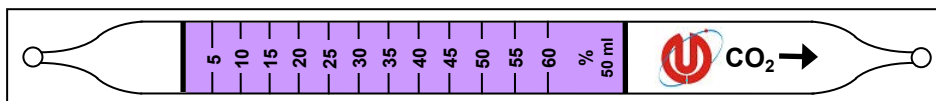
# Carbon Dioxide $\text{CO}_2$

TWA (TLV): 5000 ppm

STEL (TLV): 30,000 ppm

# SCD-10

Flammable Range: NA



Range Class	Extended	Standard	Extended
Measurement Range	2.5-30%	5-60%	Do not extend
No. of Pump Strokes	1 (100 mL)	0.5 (50 mL)	
Correction Factor ( $\text{CF}_V$ )*	0.5	1.0	
Sampling Time	2.0 min. for 1/2 pump stroke 2.5 min. for 1 stroke		
Color Change	Purple → Off white		
Shelf Life	3 years		
Active Reagent(s)	Sodium hydroxide		

\* Multiply the observed reading by the correction factor ( $\text{CF}_V$ ) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F) and 50% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response
$\text{CH}_4$	2.5%	0
CO	3.8%	0
$\text{NH}_3$	500	0
NO	100	0
$\text{H}_2\text{S}$	1%	0
$\text{SO}_2$	3.5%	0
Isobutylene	106	0
n-Hexane	1200	0
Toluene	100	0

Acid gases such as HCl give a positive response when co-existing.

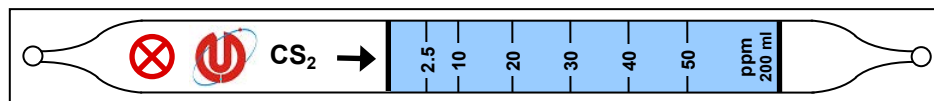
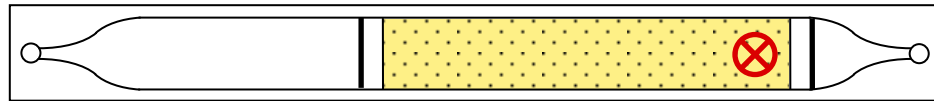
# Carbon Disulphide $\text{CS}_2$

TWA (TLV): 1 ppm

STEL (REL): 10 ppm

# SCS-2

Flammable Range: 1.3-50%



Range Class	Extended	Standard	Extended
Measurement Range	1.25-25 ppm	2.5-50 ppm	5-100 ppm
No. of Pump Strokes	4 (400 mL)	2 (200 mL)	1 (100 mL)
Correction Factor ( $\text{CF}_V$ )*	0.5	1.0	2.0
Sampling Time	1.5 minutes per pump stroke		
Color Change	Blue → Yellow		
Shelf Life	3 years		
Active Reagent(s)	Chromium trioxide, pH indicator, barium chloride		

\* Multiply the observed reading by the correction factor ( $\text{CF}_V$ ) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	$\text{CF}_X$ *	Comments
$\text{H}_2\text{S}$	50	36	1.4	
$\text{NH}_3$	70	0		
$\text{CH}_4$	10000	16		
Hexane	35	0		

\* Multiply the observed reading by the correction factors ( $\text{CF}_V \cdot \text{CF}_X$ ) to obtain the true concentration.

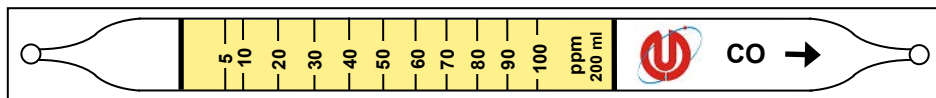
# Carbon Monoxide co

TWA (TLV): 25 ppm

STEL (TLV): 50 ppm

# SCO-3

Flammable Range: 13-74%



Range Class	Extended	Standard	Extended
<b>Measurement Range</b>	2.5-50 ppm	5-100 ppm	10-200 ppm
<b>No. of Pump Strokes</b>	4 (400 mL)	2 (200 mL)	1 (100 mL)
<b>Correction Factor (CF<sub>V</sub>)*</b>	0.5	1.0	2.0
<b>Sampling Time</b>	1.5 minutes per pump stroke		
<b>Color Change</b>	Yellow → Greenish Brown		
<b>Shelf Life</b>	1 year (Refrigeration at ≤45°F (≤7°C) required)		
<b>Active Reagent(s)</b>	Palladium compound		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F) and 50% RH.

## CROSS-SENSITIVITIES:

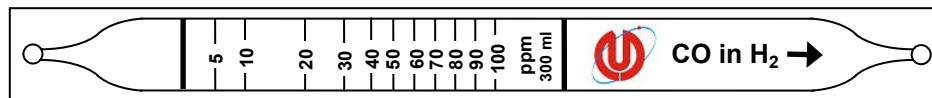
Compound	Conc. (ppm)	Apparent Response
CH <sub>4</sub>	25000	0
NH <sub>3</sub>	300	4
NO	200	0
H <sub>2</sub> S	100	10
Isobutylene	106	0
n-Hexane	100	0
Toluene	100	0
Trichloroethylene	25	0

# Carbon Monoxide in H<sub>2</sub> co SCH-3

TWA (TLV): 25 ppm

STEL (TLV): 50 ppm

Flammable Range: 13-74%



Range Class	Standard	Extended	Extended
<b>Measurement Range</b>	5-100 ppm	Do not extend	Do not extend
<b>No. of Pump Strokes</b>	3 (300 mL)		
<b>Correction Factor (CF<sub>V</sub>)*</b>	1.0		
<b>Sampling Time</b>	1.5 minutes per pump stroke		
<b>Color Change</b>	White → Brown with Green top		
<b>Shelf Life</b>	1 year		
<b>Active Reagent(s)</b>	Iodine pentoxide		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F) and 50% RH.

## CROSS-SENSITIVITIES:

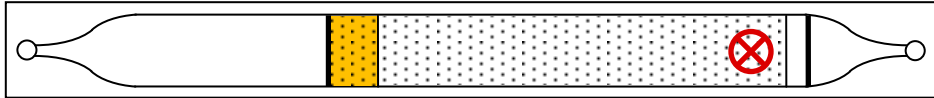
Compound	Conc. (ppm)	Apparent Response	Comments
H <sub>2</sub>	100%	0	
CH <sub>4</sub>	50000	0	
CO <sub>2</sub>	50000	5	
NO <sub>2</sub>	200	5	
H <sub>2</sub> S	100	3	
SO <sub>2</sub>	100	6	Diffuse
Isobutylene	106	6	Diffuse
n-Hexane	115	≥100	Diffuse
Toluene	100	5	Diffuse

# Carbon Tetrachloride CCl4 SCT-3L

TWA (TLV): 5 ppm

STEL (TLV): 10

Flammable Range: NA



Range Class	Extended	Standard	Extended
Measurement Range	0.5-30 ppm	1-60 ppm	2-120 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2.0
Sampling Time	2 minutes per pump stroke		
Color Change	White → Pale red		
Shelf Life	1 year (Refrigeration at ≤45°F (7°C) required)		
Active Reagent(s)	Chromium (VI) compound, Iodine pentoxide, Nitrobenzylpyridine and N-benzylaniline		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 10-90% RH.

## CROSS-SENSITIVITIES:

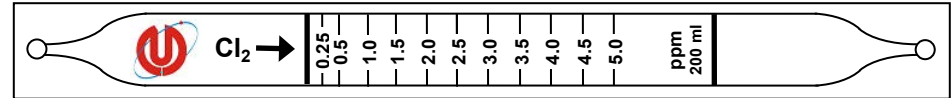
Compound	Conc. (ppm)	Apparent Response	Comments
Methylene chloride	50	0	
Methyl bromide	50	40	Very faint
Vinyl chloride	50	0	

# Chlorine Cl2 SCL-1M

TWA (TLV): 0.5 ppm

STEL (TLV): 1 ppm

Flammable Range: NA



Range Class	Extended	Standard	Extended
Measurement Range		0.25-5.0 ppm	0.5-10 ppm
No. of Pump Strokes		2 (200 mL)	1 (100 mL)
Correction Factor (CF <sub>V</sub> )*		1.0	2.0
Sampling Time	1.5 minutes per pump stroke		
Color Change	White → Light Orange		
Shelf Life	2 years		
Active Reagent(s)	o-Tolidine		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>x</sub> *	Comments
ClO <sub>2</sub>	1	2.7	0.37	
CH <sub>4</sub>	25000	0		
NH <sub>3</sub>	50000	0		
CO <sub>2</sub>	15000	0		
H <sub>2</sub> S	250	0		
NO <sub>2</sub>	3.4	1.5	2.2	
Isobutylene	2000	0.25		Faint color

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>x</sub>) to obtain the true concentration.

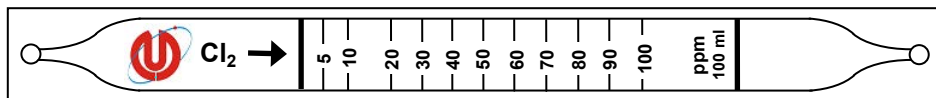
# Chlorine Cl<sub>2</sub>

TWA (TLV): 0.5 ppm

STEL (TLV): 1 ppm

Flammable Range: NA

## SCL-3



Range Class	Extended	Standard	Extended
Measurement Range	2.5-50 ppm	5-100 ppm	10-200 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2.0
Sampling Time	1.5 minutes per pump stroke		
Color Change	White → Light orange		
Shelf Life	2 years		
Active Reagent(s)	o-Tolidine		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

### TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

### CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>X</sub> *	Comments
ClO <sub>2</sub>	9	45	0.2	Diffuse
NO	100	20		
NO <sub>2</sub>	3.4	1		
NO <sub>2</sub>	200	30		
CH <sub>4</sub>	25000	0		
CO	250	0		
CO <sub>2</sub>	50000	0		
NH <sub>3</sub>	100	0		
H <sub>2</sub> S	10	0		
SO <sub>2</sub>	2000	0		
Isobutylene	106	0		
n-Hexane	100	0		
Toluene	100	0		

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>X</sub>) to obtain the true concentration.

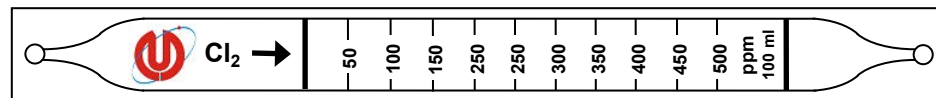
# Chlorine Cl<sub>2</sub>

TWA (TLV): 0.5 ppm

STEL (TLV): 1 ppm

Flammable Range: NA

## SCL-4M



Range Class	Extended	Standard	Extended
Measurement Range	25-250 ppm	50-500 ppm	100-1000 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2.0
Sampling Time	2.5 minutes per pump stroke		
Color Change	White → Orange		
Shelf Life	3 years		
Active Reagent(s)	o-Tolidine		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

### TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F) and 50% RH.

### CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>X</sub> *	Comments
ClO <sub>2</sub>	9	50	0.18	
CH <sub>4</sub>	25000	0		
CO	250	0		
NH <sub>3</sub>	100	0		
H <sub>2</sub> S	10	0		
SO <sub>2</sub>	2000	0		
n-Hexane	100	0		
Toluene	100	0		

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>X</sub>) to obtain the true concentration.

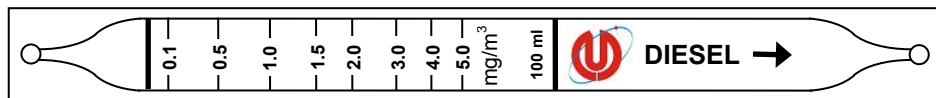
# Diesel Fuel

TWA (TLV): 0.1 mg/L

STEL (TLV): NA

Flammable Range: 0.5-6%

# SDL-4



Range Class	Extended	Standard	Extended
Measurement Range	Do not extend	0.1-5 mg/L	Do not extend
No. of Pump Strokes		1 (100 mL)	
Correction Factor (CF <sub>V</sub> )*		1.0	
Sampling Time	1 minute per pump stroke		
Color Change	White → Brownish Green		
Shelf Life	1 year		
Active Reagent(s)	Iodine pentoxide		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	Comments
Gasoline	25	0.5 mg/L	
Octane	5	0.2 mg/L	
Styrene	20	0	
Xylenes	25	0	
Toluene	25	≤0.1 mg/L	
Benzene	25	0	
n-Hexane	25	0.1 mg/L	
Propane	100	0	
Acetone	50	0	
Isopropanol	400	0	
Ethanol	2000	0	
CH <sub>4</sub>	2.5%	0	
CO	10	0	
CO <sub>2</sub>	10000	0	
H <sub>2</sub> S	60	0.1 mg/L	Light color

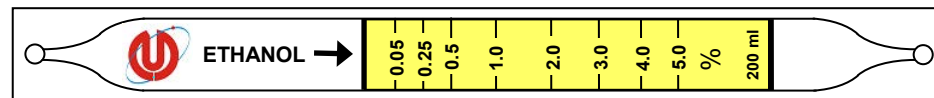
# Ethanol C<sub>2</sub>H<sub>5</sub>OH

TWA (TLV): 1000 ppm

STEL (TLV): NA

Flammable Range: 3-19%

# SET-7



Range Class	Extended	Standard	Extended
Measurement Range	Do not extend	0.05-5.0%	0.1-10%
No. of Pump Strokes		2 (200 mL)	1 (100 mL)
Correction Factor (CF <sub>V</sub> )*		1.0	2.0
Sampling Time	1.5 minutes per pump stroke		
Color Change	Yellow → Light green		
Shelf Life	3 years		
Active Reagent(s)	Chromium (VI) compound		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>X</sub> *	Comments
Methanol	0.1%	0.29%	0.34	
Isopropanol	0.1%	0.05%	2	
CH <sub>4</sub>	2.5%	0.05%		
CO	0.1%	0.05%		
CO <sub>2</sub>	0.5%	0.05%		
NH <sub>3</sub>	0.04%	≤0.02%		
NO	0.01%	0.05%		
H <sub>2</sub> S	0.01%	1%		Diffuse
n-Hexane	0.01%	0		
Benzene	0.01%	0		
Ethyl acetate	0.1%	0.03%		

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>•CF<sub>X</sub>) to obtain the true concentration.

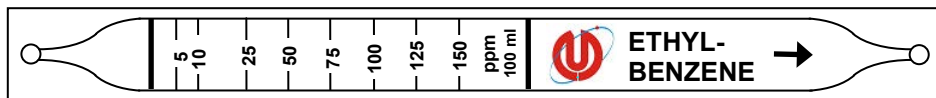
# Ethylbenzene C<sub>8</sub>H<sub>10</sub>

TWA (TLV): 100 ppm

STEL (TLV): 125 ppm

Flammable Range: 1-8%

# SEB-4L



Range Class	Extended	Standard	Extended
Measurement Range	5-75 ppm	10-150 ppm	20-300 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2.0
Sampling Time	1.5 minutes per pump stroke		
Color Change	White → Brown		
Shelf Life	2 years		
Active Reagent	Iodine pentoxide		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>X</sub> *	Comments
Benzene	20	5	4	
Toluene	45	15	3	
Xylenes	60	20	3	
Methanol	5500	0		
n-Hexane	300	0		

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>X</sub>) to obtain the true concentration.

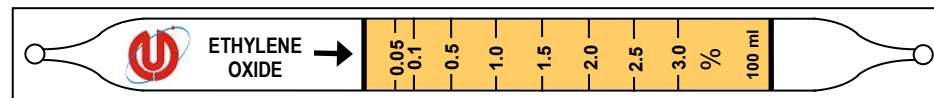
# Ethylene Oxide C<sub>2</sub>H<sub>4</sub>O

TWA (TLV): 1 ppm

STEL (TLV): NA

Flammable Range: 4-100%

# SEO-7



Range Class	Extended	Standard	Extended
Measurement Range	0.025-1.5%	0.05-3.0%	0.1-6.0%
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2.0
Sampling Time	2 minutes per pump stroke		
Color Change	Orange → Brownish Green		
Shelf Life	2 years		
Active Reagent(s)	Chromium (VI) compound		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>X</sub> *	Comments
CH <sub>4</sub>	2.5%	0.01%		Yellow
Methanol	2%	0		
Acetone	1%	0.9%	1.1	Brown color
n-Hexane	0.5%	Entire tube		Brown color
Isobutylene	1%	2.5%	0.4	
Toluene	0.1%	0.07%		
Xylenes	0.1%	0.5%		

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>X</sub>) to obtain the true concentration.

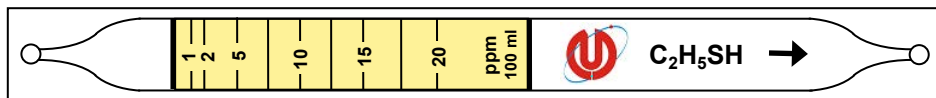
Alcohols, ketones esters, aromatics and other hydrocarbons produce a similar color.

# Ethyl Mercaptan $C_2H_5SH$ SEM-2M

TWA (TLV): 0.5 ppm

STEL (TLV): NA

Flammable Range: 3-18%



Range Class	Extended	Standard	Extended
<b>Measurement Range</b>	0.5-10 ppm	1-20 ppm	2-40 ppm
<b>No. of Pump Strokes</b>	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
<b>Correction Factor (CF<sub>V</sub>)*</b>	0.5	1.0	2.0
<b>Sampling Time</b>	1.5 minutes per pump stroke		
<b>Color Change</b>	Yellow → Pink		
<b>Shelf Life</b>	2 years		
<b>Active Reagent(s)</b>	Mercuric chloride		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°C) and 50% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>X</sub> *	Comments
Methyl mercaptan	1-20	1-20	1.0	
t-Butyl mercaptan	1-20	1-20	1.0	
CH <sub>4</sub>	25000	0		
CO <sub>2</sub>	10%	0		
H <sub>2</sub> S	10	7.5	1.3	
NH <sub>3</sub>	100	0		
PH <sub>3</sub>	10	25	0.4	
SO <sub>2</sub>	30	0		

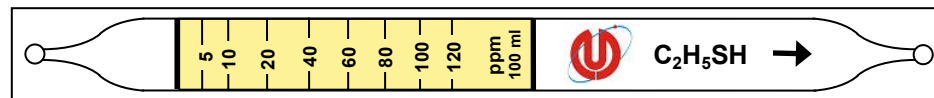
\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>X</sub>) to obtain the true concentration.

# Ethyl Mercaptan $C_2H_5SH$ SEM-4L

TWA (TLV): 0.5 ppm

STEL (TLV): NA

Flammable Range: 3-18%



Range Class	Extended	Standard	Extended
<b>Measurement Range</b>	2.5-60 ppm	5-120 ppm	10-240 ppm
<b>No. of Pump Strokes</b>	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
<b>Correction Factor (CF<sub>V</sub>)*</b>	0.5	1.0	2.0
<b>Sampling Time</b>	1.5 minutes per pump stroke		
<b>Color Change</b>	Yellow → Pink		
<b>Shelf Life</b>	2 years		
<b>Active Reagent(s)</b>	Mercuric chloride		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>X</sub> *	Comments
Methyl mercaptan	5-120	5-120	1.0	
t-Butyl mercaptan	5-120	5-120	1.0	
CH <sub>4</sub>	25000	0		
CO <sub>2</sub>	10%	0		
H <sub>2</sub> S	10	7.5	1.3	
NH <sub>3</sub>	100	0		
PH <sub>3</sub>	10	25	0.4	
SO <sub>2</sub>	30	0		

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>X</sub>) to obtain the true concentration.

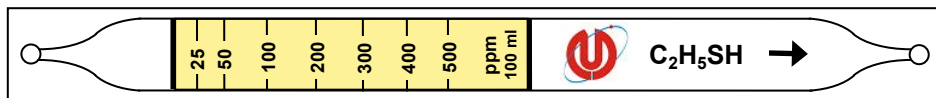
# Ethyl Mercaptan C<sub>2</sub>H<sub>5</sub>SH

TWA (TLV): 0.5 ppm

STEL (TLV): NA

# SEM-4M

Flammable Range: 3-18%



Range Class	Extended	Standard	Extended
Measurement Range	12.5-250 ppm	25-500 ppm	Do not extend
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	
Sampling Time	1.5 minutes per pump stroke		
Color Change	Yellow → Red		
Shelf Life	2 years		
Active Reagent(s)	Mercuric chloride		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>X</sub> *	Comments
Methyl mercaptan	25-500	25-500	1.0	
t-Butyl mercaptan	25-500	25-500	1.0	
CH <sub>4</sub>	25000	0		
CO <sub>2</sub>	5000	0		
H <sub>2</sub> S	100	36	2.8	
NH <sub>3</sub>	100	0		

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>X</sub>) to obtain the true concentration.

# Formaldehyde HCHO

C (TLV): 0.3 ppm

STEL (TLV): NA

# SFO-1M

Flammable Range: 7.0 – 73%

## Specification:

	Extended	Standard	Extended
Measurement Range	Do not extend	0.1 – 5 ppm	Do not extend
No. of Pump Strokes		5 (500 mL)	
Volume Correction Factor (VCF)*		1.0	
Sampling Time	2 minutes per pump stroke (100 mL)		
Color Change	Yellow → Pink		
Shelf Life	1 year		
Storage condition	Below 10°C (50°F) in Refrigerator		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Reaction Principle	HCHO + (NH <sub>2</sub> OH) <sub>3</sub> H <sub>3</sub> PO <sub>4</sub> → H <sub>3</sub> PO <sub>4</sub> H <sub>3</sub> PO <sub>4</sub> + Base → Phosphate		
Relative standard deviation	± 10 %		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## Possible Interferences:

Compound	Concentration (ppm)	Interference	Colour change / Comments
Aldehydes		+	Yellow to Pink
Ketones		+	Yellow to Pink

## Correction for Environmental Parameters:

Temperature	Not necessary between 0 - 40°C (32 - 104°F).
Relative humidity	Not necessary between 10 - 90 %.





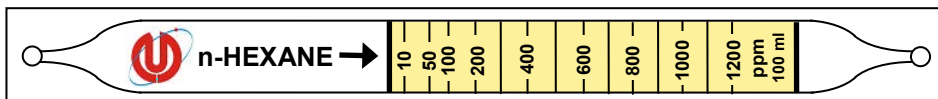


# Hydrocarbons (n-Hexane) C<sub>6</sub>H<sub>14</sub> SHE-5L

TWA (TLV): 50 ppm

STEL (TLV): NA

Flammable Range: 1-8%



Range Class	Extended	Standard	Extended
Measurement Range	Do not extend	10-1200 ppm	20-2400 ppm
No. of Pump Strokes		1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>V</sub> )*		1.0	2.0
Sampling Time	1 minute per pump stroke		
Color Change	Yellow → Light Green		
Shelf Life	2 years		
Active Reagent(s)	Chromium (VI) compound		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>x</sub> *	Comments
CH <sub>4</sub>	1000	≤10		Slight ring
Propane	100	0		
Isobutylene	1060	10		
n-Pentane	700	1000	0.7	
n-Hexane	100	100	1.0	Calibration compound
Cyclohexane	1200	1000	1.2	
Octane	400	300	1.3	
Benzene	500	800	0.6	
Toluene	1000	30		
Xylenes	1330	200		
Isopropanol	1000	≤10		Slight ring
Acetone	10000	10		
H <sub>2</sub> S	1000	800		

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>\*CF<sub>x</sub>) to obtain the true concentration.

# Hydrocarbons (n-Hexane) C<sub>6</sub>H<sub>14</sub> SHE-6L

TWA (TLV): 50 ppm

STEL (TLV): NA

Flammable Range: 1-8%

## SPECIFICATION:

Measurement Range	Extended	Standard	Extended
Do not extend		0.025 – 0.6 %	Do not extend
No. of Pump Strokes		1 (100 mL)	
Volume Correction Factor (VCF)*		1.0	
Sampling Time	1 minutes per pump stroke (100 mL)		
Color Change	Orange → Brownish green		
Shelf Life	2 years		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Chromium (VI) compound		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## CORRECTION FOR TEMPERATURE AND HUMIDITY:

Temperature - Not necessary between 0 - 40°C (32 - 104°F).

Relative humidity - Not necessary between 10 - 90 %.

## POSSIBLE INTERFERENCES:

Compound	Concentration (%)	Interference	Colour change / Comments
Organic vapours		+	Brownish Green

## OTHER MEASURABLE COMPOUNDS:

Compound	Correction Factor	No. of pump strokes	Measuring range
Hexane	1	1	0.025 – 0.6 %
Cyclohexane	1.3	1	0.0325 – 0.78 %
n-Pentane	0.34	1	0.0085 – 0.204 %
n-Octane	3.8	1	0.095 – 2.28 %
n-Heptane	2.35	1	0.05875 – 1.41 %

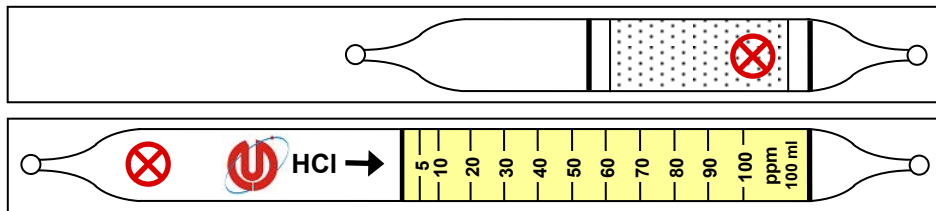


# Hydrogen Chloride HCl SHC-3

TWA (TLV): NA

Ceiling (TLV): 2 ppm

Flammable Range: NA



Range Class	Extended	Standard	Extended
Measurement Range	2.5-50	5-100 ppm	10-200 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2.0
Sampling Time	1 minute per pump stroke		
Color Change	Yellow → Pink		
Shelf Life	2 years		
Active Reagent	Acid/base color change		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	Comments
HF	93	40	Diffuse
Cl <sub>2</sub>	150	>100	Over-range
CH <sub>4</sub>	25000	0	
CO	14800	0	
CO <sub>2</sub>	1000	0	
NH <sub>3</sub>	100	0	
NO	200	0	
NO <sub>2</sub>	200	0	
H <sub>2</sub> S	100	0	
SO <sub>2</sub>	1000	0	
n-Hexane	2000	0	
Toluene	2000	0	

# Hydrogen Chloride HCl SHC-4

TWA (TLV): NA

Ceiling (TLV): 2 ppm

Non Flammable

## SPECIFICATION:

Measurement Range	Extended	Standard	Extended
Measurement Range	25 - 500 ppm	50 -1000 ppm	100 - 2000 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Volume Correction Factor (VCF)*	0.5	1.0	2
Sampling Time	1 minute per pump stroke		
Color Change	Yellow → Pink		
Shelf Life	2 years		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Base, pH Indicator		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## CORRECTION FOR TEMPERATURE AND HUMIDITY:

Temperature - Not necessary between 0- 40°C (32 - 104°F).

Relative humidity - Not necessary between 10-90 %RH.

## POSSIBLE INTERFERENCES:

Compound	Concentration (ppm)	Interference	Colour change / Comments
Cl <sub>2</sub>		+	Yellow to White
HF		+	Diffuse
NH <sub>3</sub>	100	No	No effect
NO <sub>2</sub>	200	No	No effect
H <sub>2</sub> S	100	No	No effect



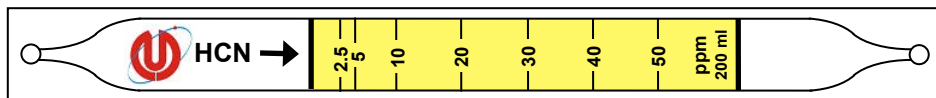
# Hydrogen Cyanide HCN

TWA (TLV): NA

Ceiling (TLV): 4.7 ppm

Flammable Range: 6-40%

# SHN-2



Range Class	Extended	Standard	Extended
Measurement Range	1.25-25 ppm	2.5-50 ppm	5-100 ppm
No. of Pump Strokes	4 (400 mL)	2 (200 mL)	1 (100 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2.0
Sampling Time	1.5 minutes per pump stroke		
Color Change	Yellow → Red		
Shelf Life	2 years		
Active Reagent(s)	Mercuric chloride		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F) and 50% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	Comments
CH <sub>4</sub>	25000	0	
CO	300	20	Red ring
CO <sub>2</sub>	5000	20	Faint
NH <sub>3</sub>	50	<2.5	
H <sub>2</sub> S	100	72	
SO <sub>2</sub>	20	60	
HCl	50	5	

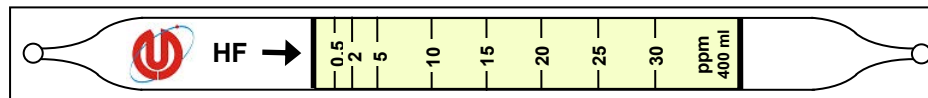
# Hydrogen Fluoride HF

TWA (TLV): 0.5 ppm

Ceiling (TLV): 2 ppm

Flammable Range: NA

# SHF-2



Range Class	Extended	Standard	Extended
Measurement Range	Do not extend	0.5-30 ppm	1-60 ppm
No. of Pump Strokes		4 (400 mL)	2 (200 mL)
Correction Factor (CF <sub>V</sub> )*		1.0	2.0
Sampling Time	1 minute per pump stroke		
Color Change	Yellowish Green → Purple		
Shelf Life	2 years		
Active Reagent(s)	Acid/base pH change		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F) and 50% RH.

Relative Humidity at 20°C:	40%	50%	60%	80%
Correction Factor (CF <sub>H</sub> ):	0.6	1.0	1.4	1.8

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>H</sub>) to obtain the true concentration.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>x</sub> *
HCl	5	9	0.56
CH <sub>4</sub>	25000	0	
CO	250	0	
CO <sub>2</sub>	50000	0	
Cl <sub>2</sub>	27	0	
NH <sub>3</sub>	300	0	
NO	100	0	
H <sub>2</sub> S	800	0	
SO <sub>2</sub>	200	0	

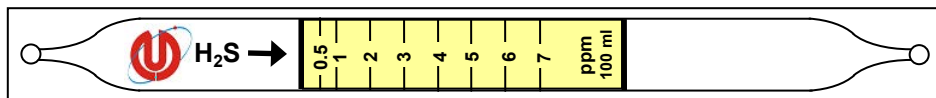
\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>H</sub>·CF<sub>x</sub>) to obtain the true concentration.

# Hydrogen Sulphide H<sub>2</sub>S SHS-1H

TWA (TLV): 10 ppm

STEL (TLV): 15 ppm

Flammable Range: 4-44%



Range Class	Extended	Standard	Extended
<b>Measurement Range</b>	0.25-3.5 ppm	0.5-7 ppm	1-14 ppm
<b>No. of Pump Strokes</b>	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
<b>Correction Factor (CF<sub>V</sub>)*</b>	0.5	1.0	2.0
<b>Sampling Time</b>	2 minutes per pump stroke		
<b>Color Change</b>	Yellow → Pink		
<b>Shelf Life</b>	1 year		
<b>Active Reagent</b>	Mercuric chloride		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F).

Relative Humidity at 20°C:	<10%	30%	50%	70%	90%
<b>Correction Factor (CF<sub>H</sub>):</b>	0.7	1.0	1.0	1.15	1.35

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>•CF<sub>H</sub>) to obtain the true concentration.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>X</sub> *	Comments
H <sub>2</sub> S in Natural Gas	4.3	7	0.61	Read end of pink band
Mercaptans	5	7		
NH <sub>3</sub>	100	0		
NO <sub>2</sub>	5	0		
PH <sub>3</sub>	10	Over-range		
SO <sub>2</sub>	30	0		

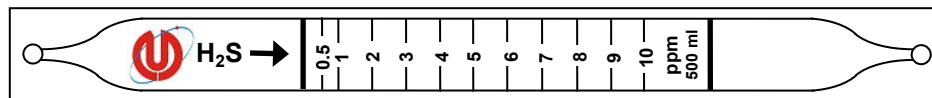
\* Multiply the observed reading by the correction factors (CF<sub>V</sub>•CF<sub>H</sub>•CF<sub>X</sub>) to obtain the true concentration.

# Hydrogen Sulphide H<sub>2</sub>S SHS-1

TWA (TLV): 10 ppm

STEL (TLV): 15 ppm

Flammable Range: 4-44%



Range Class	Extended	Standard	Extended
<b>Measurement Range</b>	Do not extend	0.5-10 ppm	Do not extend
<b>No. of Pump Strokes</b>		5 (500 mL)	
<b>Correction Factor (CF<sub>V</sub>)*</b>		1.0	
<b>Sampling Time</b>	1.5 minutes per pump stroke		
<b>Color Change</b>	White → Brown		
<b>Shelf Life</b>	2 years		
<b>Active Reagent</b>	Lead acetate		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 10-90% RH.

## CROSS-SENSITIVITIES:

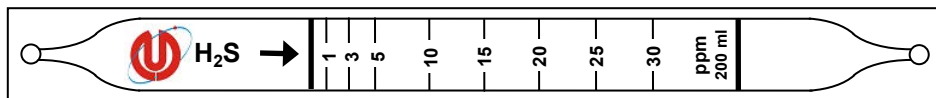
Compound	Conc. (ppm)	Apparent Response
t-Butyl mercaptan	100	0
CH <sub>4</sub>	25000	0
CO	250	0
CS <sub>2</sub>	100	0
NH <sub>3</sub>	100	0
NO <sub>2</sub>	3.4	0
SO <sub>2</sub>	100	0
Isobutylene	106	0
n-Hexane	100	0
Toluene	100	0

# Hydrogen Sulphide H<sub>2</sub>S SHS-2

TWA (TLV): 10 ppm

STEL (TLV): 15 ppm

Flammable Range: 4-44%



Range Class	Extended	Standard	Extended
Measurement Range	0.5-15 ppm	1-30 ppm	2-60 ppm
No. of Pump Strokes	4 (400 mL)	2 (200 mL)	1 (100 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2.0
Sampling Time	1.5 minutes per pump stroke		
Color Change	White → Light Brown		
Shelf Life	3 years		
Active Reagent(s)	Lead acetate		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

## CROSS-SENSITIVITIES:

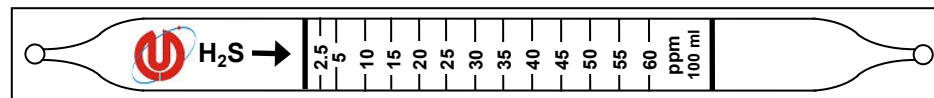
Compound	Conc. (ppm)	Apparent Response
t-Butyl Mercaptan	100	0
CH <sub>4</sub>	25000	0
CO	250	0
CS <sub>2</sub>	100	0
NH <sub>3</sub>	300	0
NO <sub>2</sub>	200	0
SO <sub>2</sub>	20	0
SO <sub>2</sub>	1800	0
Isobutylene	106	0
n-Hexane	100	0
Toluene	100	0

# Hydrogen Sulphide H<sub>2</sub>S SHS-3L

TWA (TLV): 10 ppm

STEL (TLV): 15 ppm

Flammable Range: 4-44%



Range Class	Extended	Standard	Extended
Measurement Range	1.25-30 ppm	2.5-60 ppm	5-120 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2.0
Sampling Time	1.5 minutes per pump stroke		
Color Change	White → Brown		
Shelf Life	3 years		
Active Reagent	Lead acetate		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response
t-Butyl Mercaptan	100	0
CH <sub>4</sub>	25000	0
CO	250	0
CS <sub>2</sub>	100	0
NH <sub>3</sub>	300	0
NO <sub>2</sub>	200	0
SO <sub>2</sub>	20	0
SO <sub>2</sub>	1800	0
Isobutylene	106	0
n-Hexane	100	0
Toluene	100	0

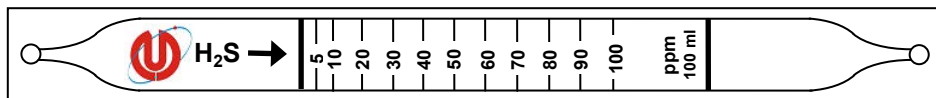
# Hydrogen Sulphide H<sub>2</sub>S

TWA (TLV): 10 ppm

STEL (TLV): 15 ppm

# SHS-3

Flammable Range: 4-44%



Range Class	Extended	Standard	Extended
Measurement Range	2.5-50 ppm	5-100 ppm	10-200 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2.0
Sampling Time	1.5 minutes per pump stroke		
Color Change	White → Brown		
Shelf Life	3 years		
Active Reagent(s)	Lead acetate		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response
t-Butyl Mercaptan	100	0
CH <sub>4</sub>	25000	0
CO	250	0
NH <sub>3</sub>	100	0
NO <sub>2</sub>	200	0
Isobutylene	106	0
Toluene	100	0

# H<sub>2</sub>S & SO<sub>2</sub>

H<sub>2</sub>S: TWA (TLV): 1 ppm

SO<sub>2</sub>: TWA (TLV): 2 ppm

STEL (TLV): 5 ppm

STEL (TLV): 5 ppm

# SHS-3L & SSD-1

Flammable Range: 4-44%

Flammable Range: NA

## SPECIFICATION:

	Extended	Standard	Extended
Measurement Range(H <sub>2</sub> S)	Do not extend	2.5 – 60 ppm	Do not extend
Measurement Range(SO <sub>2</sub> )		0.5 – 10 ppm	
No. of Pump Strokes		1 (100 mL)	
Volume Correction Factor (VCF)*		1.0	
Sampling Time	2 minutes per pump stroke (100 mL)		
Color Change	H <sub>2</sub> S: White → Brown ; SO <sub>2</sub> : Purple → Yellow		
Shelf Life	1 year		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Lead acetate , Acid/base		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## CORRECTION FOR TEMPERATURE AND HUMIDITY:

Temperature - Not necessary between 0 - 40°C (32 - 104°F).

Relative humidity - Not necessary between 10 - 90 %.

## POSSIBLE INTERFERENCES: (For Both H<sub>2</sub>S & SO<sub>2</sub>)

Compound	Concentration (ppm)	Interference	Colour change / Comments
Toluene	100	No	No effect
CO	250	No	No effect
NH <sub>3</sub>	100	No	No effect
Isobutylene	106	No	No effect

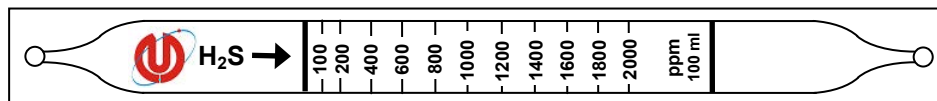


# Hydrogen Sulphide H<sub>2</sub>S SHS-5M

TWA (TLV): 10 ppm

STEL (TLV): 15 ppm

Flammable Range: 4-44%



Range Class	Extended	Standard	Extended
<b>Measurement Range</b>	50-1000 ppm	100-2000 ppm	200-4000 ppm
<b>No. of Pump Strokes</b>	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
<b>Correction Factor (CF<sub>v</sub>)*</b>	0.5	1.0	2.0
<b>Sampling Time</b>	1.5 minutes per pump stroke		
<b>Color Change</b>	White → Brown		
<b>Shelf Life</b>	3 years		
<b>Active Reagent(s)</b>	Lead acetate		

\* Multiply the observed reading by the correction factor (CF<sub>v</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

## CROSS-SENSITIVITIES:

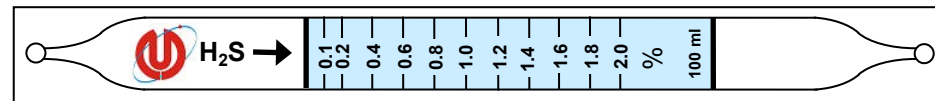
Compound	Conc. (ppm)	Apparent Response
t-Butyl Mercaptan	500	0
CH <sub>4</sub>	25000	0
CO	250	0
CS <sub>2</sub>	100	0
NH <sub>3</sub>	300	0
NO <sub>2</sub>	200	0
SO <sub>2</sub>	20	0
Isobutylene	106	0
n-Hexane	100	0
Toluene	100	0

# Hydrogen Sulphide H<sub>2</sub>S SHS-7M

TWA (TLV): 10 ppm

STEL (TLV): 15 ppm

Flammable Range: 4-44%



Range Class	Extended	Standard	Extended
<b>Measurement Range</b>	0.05-1.0%	0.1-2.0%	0.2-4.0%
<b>No. of Pump Strokes</b>	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
<b>Correction Factor (CF<sub>v</sub>)*</b>	0.5	1.0	2.0
<b>Sampling Time</b>	2.5 minutes per pump stroke		
<b>Color Change</b>	Light Blue → Dark Brown		
<b>Shelf Life</b>	3 years		
<b>Active Reagent(s)</b>	Copper sulfate		

\* Multiply the observed reading by the correction factor (CF<sub>v</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F) and 50% RH.

## CROSS-SENSITIVITIES:

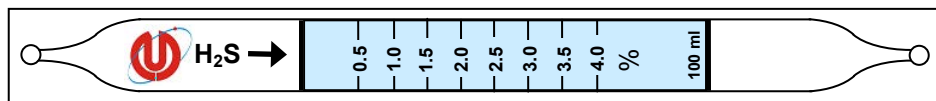
Compound	Conc. (ppm)	Apparent Response	Comments
t-Butyl Mercaptan	0.2%	0.1%	Greenish-yellow
CH <sub>4</sub>	2.5%	0	
CO	3000	0	
CS <sub>2</sub>	100	0	
NH <sub>3</sub>	300	0	
NO	100	0	
NO <sub>2</sub>	200	0	
SO <sub>2</sub>	20	0	
Isobutylene	106	0	
n-Hexane	1200	0	
Toluene	100	0	

# Hydrogen Sulphide H<sub>2</sub>S SHS-7

TWA (TLV): 10 ppm

STEL (TLV): 15 ppm

Flammable Range: 4-44%



Range Class	Extended	Standard	Extended
<b>Measurement Range</b>	0.25-2.0%	0.5-4.0%	1.0-8.0%
<b>No. of Pump Strokes</b>	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
<b>Correction Factor (CF<sub>V</sub>)*</b>	0.5	1.0	2.0
<b>Sampling Time</b>	1.5 minutes per pump stroke		
<b>Color Change</b>	Light Blue → Dark Brown		
<b>Shelf Life</b>	3 years		
<b>Active Reagent(s)</b>	Copper sulfate		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F) and 50% RH.

## CROSS-SENSITIVITIES:

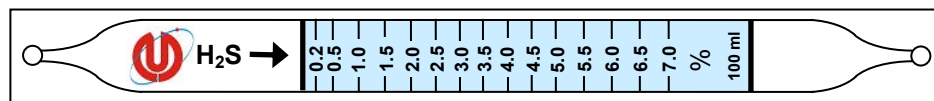
Compound	Conc. (ppm)	Apparent Response	Comments
t-Butyl Mercaptan	0.5%	~0.3%	Diffuse greenish-yellow
CH <sub>4</sub>	2.5%	0	
CO	3000	0	
CS <sub>2</sub>	40%	0	
NH <sub>3</sub>	300	0	
NO	2550	0	
NO <sub>2</sub>	1020	0	
SO <sub>2</sub>	30	0	
Isobutylene	106	0	
n-Hexane	1200	0	
Toluene	100	0	

# Hydrogen Sulphide H<sub>2</sub>S SHS-8L

TWA (TLV): 10 ppm

STEL (TLV): 15 ppm

Flammable Range: 4-44%



Range Class	Extended	Standard	Extended
<b>Measurement Range</b>	0.1-3.5%	0.2-7.0%	0.4-14%
<b>No. of Pump Strokes</b>	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
<b>Correction Factor (CF<sub>V</sub>)*</b>	0.5	1.0	2.0
<b>Sampling Time</b>	2.5 minutes per pump stroke		
<b>Color Change</b>	Light Blue → Dark Brown		
<b>Shelf Life</b>	3 years		
<b>Active Reagent(s)</b>	Copper sulfate		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

## CROSS-SENSITIVITIES:

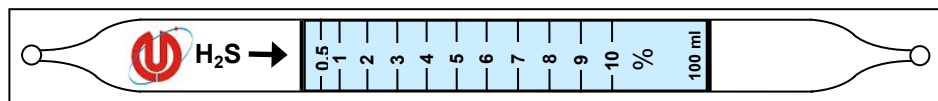
Compound	Conc. (ppm)	Apparent Response	Comments
t-Butyl Mercaptan	0.5%	~0.5%	Faint light green color
CH <sub>4</sub>	2.5%	0	
CO	3000	0	
CS <sub>2</sub>	40%	0	
NH <sub>3</sub>	300	0	
NO	2550	0	
NO <sub>2</sub>	1020	0	
SO <sub>2</sub>	30	0	
Isobutylene	106	0	
n-Hexane	1200	0	
Toluene	100	0	

# Hydrogen Sulphide H<sub>2</sub>S SHS-8M

TWA (TLV): 10 ppm

STEL (TLV): 15 ppm

Flammable Range: 4-44%



Range Class	Extended	Standard	Extended
<b>Measurement Range</b>	0.25-5%	0.5-10%	1-20%
<b>No. of Pump Strokes</b>	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
<b>Correction Factor (CF<sub>V</sub>)*</b>	0.5	1.0	2.0
<b>Sampling Time</b>	2.5 minutes per pump stroke		
<b>Color Change</b>	Light Blue → Dark Brown		
<b>Shelf Life</b>	3 years		
<b>Active Reagent(s)</b>	Copper sulfate		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 10-90% RH.

## CROSS-SENSITIVITIES:

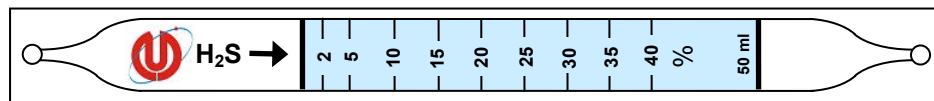
Compound	Conc. (ppm)	Apparent Response	Comments
t-Butyl Mercaptan	0.2%	~0.1%	Greenish-yellow
CO	3000	0	
NH <sub>3</sub>	300	0	
NO <sub>2</sub>	200	0	
Isobutylene	106	0	
n-Hexane	1200	0	

# Hydrogen Sulphide H<sub>2</sub>S SHS-9

TWA (TLV): 10 ppm

STEL (TLV): 15 ppm

Flammable Range: 4-44%



Range Class	Extended	Standard	Extended
<b>Measurement Range</b>	1-20%	2-40%	Do not extend
<b>No. of Pump Strokes</b>	1 (100 mL)	0.5 (50 mL)	
<b>Correction Factor (CF<sub>V</sub>)*</b>	0.5	1.0	
<b>Sampling Time</b>	3 min. for ½ pump stroke 6 min. for 1 stroke		
<b>Color Change</b>	Pale Blue → Black		
<b>Shelf Life</b>	2 years		
<b>Active Reagent(s)</b>	Copper sulfate		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	Comments
t-Butyl Mercaptan	0.5%	~0.3%	Very faint yellow color
CH <sub>4</sub>	2.5%	0	
CO	250	0	
CO <sub>2</sub>	5%	0	
NH <sub>3</sub>	10%	1.3%	
SO <sub>2</sub>	10	0	
Isobutylene	106	0	
n-Hexane	100	0	
Benzene	100	0	

# Isopropyl Alcohol $C_3H_7OH$ SIP-7M

TWA (TLV): 400 ppm

STEL (TLV): NA

Flammable Range: 2 – 12.7 %

## SPECIFICATION:

	Extended	Standard	Extended
Measurement Range	Do not extend	0.1 – 2.5 %	Do not extend
No. of Pump Strokes		3 (300 mL)	
Volume Correction Factor (VCF)*		1.0	
Sampling Time	1.5 minutes per pump stroke (100 mL)		
Color Change	Orange → Brownish green with brown top		
Shelf Life	2 years		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Chromium (VI) compound		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## CORRECTION FOR TEMPERATURE AND HUMIDITY:

**Temperature** - Not necessary between 0 - 40°C (32 - 104°F).

**Relative humidity** - Not necessary between 10 - 90 %.

## POSSIBLE INTERFERENCE:

Compound	Concentration (ppm)	Interference	Colour change / Comments
Alcohols		+	Orange to Brownish green
Esters		+	Orange to Brownish green
Ketones		+	Orange to Brownish green
Aromatic Hydrocarbons		+	Orange to Brownish green
H <sub>2</sub> S		+	Orange to Brownish green
CO	15000	No	No Effect



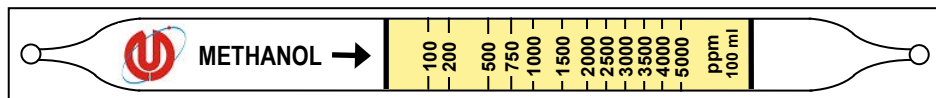
# Methanol CH<sub>3</sub>OH

TWA (TLV): 200 ppm

STEL (TLV): 250 ppm

Flammable Range: 6-37%

## SME-5



	Extended	Standard	Extended
<b>Measurement Range</b>	Do not extend	100-5000 ppm	Do not extend
<b>No. of Pump Strokes</b>		1 (100 mL)	
<b>Correction Factor (CF<sub>V</sub>)*</b>		1.0	
<b>Sampling Time</b>	1.5 minutes per pump stroke		
<b>Color Change</b>	Yellow → Light Green		
<b>Shelf Life</b>	2 years		
<b>Active Reagent(s)</b>	Chromium (VI) compound		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

### TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

### CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>X</sub> *
Ethanol	1000	250	4.0
Isopropanol	1000	200	5.0
n-Butanol	1000	185	5.4
Acetone	10000	0	
CH <sub>4</sub>	25000	0	
CO	1000	0	
CO <sub>2</sub>	10%	0	
H <sub>2</sub> S	100	0	
n-Hexane	100	0	
Ethyl acetate	1000	0	
Benzene	100	0	

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>\*CF<sub>X</sub>) to obtain the true concentration.

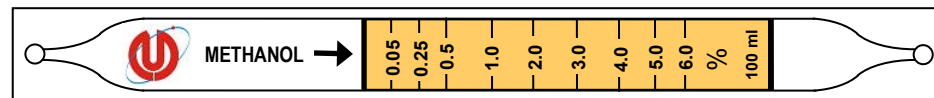
# Methanol CH<sub>3</sub>OH

TWA (TLV): 200 ppm

STEL (TLV): 250 ppm

Flammable Range: 6-37%

## SME-8L



	Extended	Standard	Extended
<b>Range Class</b>	Extended	Standard	Extended
<b>Measurement Range</b>	Do not extend	0.05-6%	0.1-12%
<b>No. of Pump Strokes</b>		2 (200 mL)	1 (100 mL)
<b>Correction Factor (CF<sub>V</sub>)*</b>		1.0	2.0
<b>Sampling Time</b>	1.5 minutes per pump stroke		
<b>Color Change</b>	Orange → Green with brown end		
<b>Shelf Life</b>	2 years		
<b>Active Reagent(s)</b>	Chromium (VI) compound		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

### TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 10-90% RH.

### CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	Comments
CH <sub>4</sub>	2.5%	0	
CO	0.1%	0	
CO <sub>2</sub>	10%	0	
Ethyl acetate	0.1%	0	

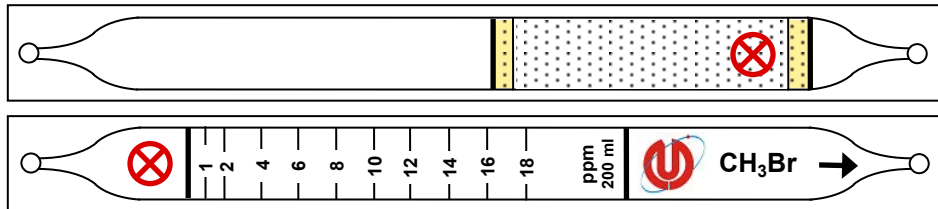
# Methyl Bromide CH<sub>3</sub>Br

TWA (TLV): 1 ppm

STEL (TLV): NA

## SMB-2M

Flammable Range: 10-16%



Range Class	Extended	Standard	Extended	Extended
<b>Measurement Range</b>	0.5-1 ppm	1-18 ppm	2-36 ppm	5-80 ppm
<b>No. of Pump Strokes</b>	3 (300 mL)	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
<b>Corr. Factor (CF<sub>V</sub>)*</b>	0.5	1.0	2.0	4.5
<b>Sampling Time</b>	1.5 minutes per pump stroke			
<b>Color Change</b>	White → Yellow			
<b>Shelf Life</b>	1 year			
<b>Active Reagent(s)</b>	Chromium trioxide, o-Tolidine			

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

### TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

### CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>x</sub> *	Comments
CH <sub>4</sub>	25000	0		
CO	500	0		
CO <sub>2</sub>	5000	0		
NO	500	0		
1,2-Dichloroethane	200	0		
1,1,1-Trichloroethane	50	0		
Tetrachloroethane	180	12	15	
Trichloroethylene	100	>18		Above scale range

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>•CF<sub>x</sub>) to obtain the true concentration.

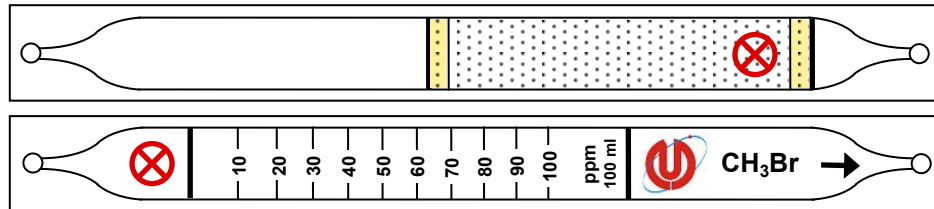
# Methyl Bromide CH<sub>3</sub>Br

TWA (TLV): 1 ppm

STEL (TLV): NA

## SMB-3

Flammable Range: 10-16%



Range Class	Extended	Standard	Extended
<b>Measurement Range</b>	5-50 ppm	10-100 ppm	20-200 ppm
<b>No. of Pump Strokes</b>	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
<b>Corr. Factor (CF<sub>V</sub>)*</b>	0.5	1.0	2.0
<b>Sampling Time</b>	1.5 minutes per pump stroke		
<b>Color Change</b>	White → Yellow		
<b>Shelf Life</b>	1 year		
<b>Active Reagent(s)</b>	Chromium trioxide, o-Tolidine		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

### TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

### CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response
CH <sub>4</sub>	25000	0
CO	500	0
CO <sub>2</sub>	5000	0
NO	500	0
1,2-Dichloroethane	200	0
1,1,1-Trichloroethane	50	0

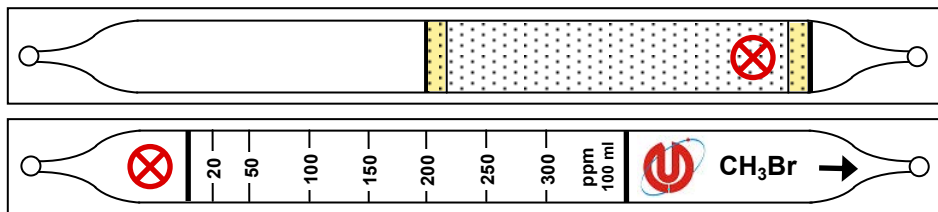
# Methyl Bromide CH<sub>3</sub>Br

TWA (TLV): 1 ppm

STEL (TLV): NA

## SMB-4M

Flammable Range: 10-16%



Range Class	Extended	Standard	Extended
<b>Measurement Range</b>	10-150 ppm	20-300 ppm	40-600 ppm
<b>No. of Pump Strokes</b>	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
<b>Corr. Factor (CF<sub>V</sub>)*</b>	0.5	1.0	2.0
<b>Sampling Time</b>	1.5 minutes per pump stroke		
<b>Color Change</b>	White → Yellow		
<b>Shelf Life</b>	1 year		
<b>Active Reagent(s)</b>	Chromium trioxide, o-Tolidine		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

### TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

### CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response
CH <sub>4</sub>	25000	0
CO	500	0
CO <sub>2</sub>	5000	0
NO	500	0
1,2-Dichloroethane	200	0
1,1,1-Trichloroethane	50	0

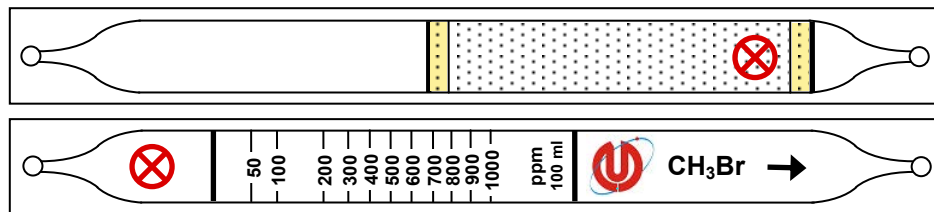
# Methyl Bromide CH<sub>3</sub>Br

TWA (TLV): 1 ppm

STEL (TLV): NA

## SMB-4

Flammable Range: 10-16%



Range Class	Extended	Standard	Extended
<b>Measurement Range</b>	25-500 ppm	50-1000 ppm	100-2000 ppm
<b>No. of Pump Strokes</b>	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
<b>Corr. Factor (CF<sub>V</sub>)*</b>	0.5	1.0	2.0
<b>Sampling Time</b>	1.5 minutes per pump stroke		
<b>Color Change</b>	White → Yellow		
<b>Shelf Life</b>	2 years		
<b>Active Reagent(s)</b>	Chromium trioxide, o-Tolidine		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

### TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

### CROSS-SENSITIVITIES:

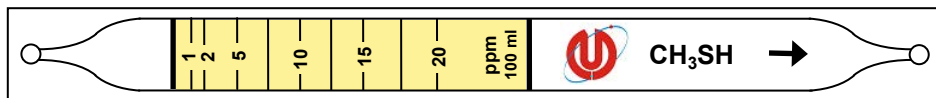
Compound	Conc. (ppm)	Apparent Response
CH <sub>4</sub>	25000	0
CO	500	0
CO <sub>2</sub>	5000	0
NO	500	0
1,2-Dichloroethane	200	0
1,1,1-Trichloroethane	50	0

# Methyl Mercaptan CH<sub>3</sub>SH SMM-2M

TWA (TLV): 0.5 ppm

STEL (TLV): NA

Flammable Range: 4-22%



Range Class	Extended	Standard	Extended
Measurement Range	0.5-10 ppm	1-20 ppm	2-40 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2.0
Sampling Time	1.5 minutes per pump stroke		
Color Change	Yellow → Pink		
Shelf Life	2 years		
Active Reagent(s)	Mercuric chloride		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F) and 50% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>X</sub> *	Comments
Ethyl mercaptan	1-20	1-20	1.0	
t-Butyl mercaptan	1-20	1-20	1.0	
CH <sub>4</sub>	25000	0		
CO <sub>2</sub>	10%	0		
H <sub>2</sub> S	10	7.5	1.3	
NH <sub>3</sub>	100	0		
PH <sub>3</sub>	10	25	0.4	
SO <sub>2</sub>	30	0		

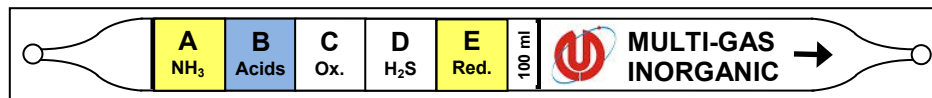
\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>X</sub>) to obtain the true concentration.

# Multi-Gas Inorganic (Qualitative) SMG-1

TWA (TLV): NA

STEL (TLV): NA

Flammable Range: NA



No. of Pump Strokes	1 (100 mL)
Sampling Time	1.5 minutes
Shelf Life	1 year
Active Reagent	Acid/base pH changes, barium chloride, o-tolidine, lead acetate, sodium disulfitepalladate(II)

## RESPONSE TABLE:

Compound	Conc. (ppm)	A Yellow (NH <sub>3</sub> )	B Blue (Acids)	C White (Oxidants)	D White (H <sub>2</sub> S)	E Yellow (Reductants)
NH <sub>3</sub>	5	Blue —	0	0	0	0
	40	Blue ≡	0	0	0	0
Amines	5	Blue —	0	0	0	0
	50	Blue ≡	0	0	0	0
SO <sub>2</sub>	2	0	Yellow —	0	0	0
	20	0	Yellow ≡	0	0	0
Acetic Acid	50	0	Yellow ≡	0	0	0
HCl	300	0	Yellow ≡	0	0	0
Cl <sub>2</sub>	5	0	Yellow =	Yellow —	0	0
	20	0	Yellow ≡	Yellow =	0	0
NO <sub>2</sub>	5	0	0	Yellow —	0	0
	20	0	Violet —	Yellow —	0	0
H <sub>2</sub> S	10	0	0	0	Brown =	0
	20	0	0	0	Brown ≡	0
CO	10	0	0	0	0	l. Brown ≡
	50	0	0	0	0	Brown ≡
PH <sub>3</sub>	2	0	0	0	0	Black —
	30	0	0	0	0	Black =
Acetylene	600	0	0	0	0	d. Brown ≡
Mercaptans	10	0	0	0	0	d. Brown —
	100	0	0	0	0	d. Brown =

Key: 0 No color change = About half layer discolored  
 — About 0.5-1 mm layer discolored ≡ Whole layer discolored





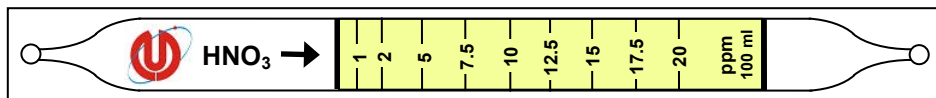
# Nitric Acid HNO<sub>3</sub>

TWA (TLV): 2 ppm

Ceiling (TLV): 4 ppm

# SNA-2M

Flammable Range: NA



Range Class	Extended	Standard	Extended
Measurement Range	0.5-10 ppm	1-20 ppm	2-40 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2.0
Sampling Time	1 minute per pump stroke		
Color Change	Greenish Yellow → Purple		
Shelf Life	1 year		
Active Reagent(s)	Acid/base pH change		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F) and 58% RH.

Relative Humidity at 20°C:	35%	46%	58%	69%	92%
Absolute Humidity (mg/L):	6	8	10	12	16
Correction Factor (CF <sub>H</sub> ):	0.4	0.7	1.0	1.2	1.5

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>•CF<sub>H</sub>) to obtain the true concentration.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	Comments
Cl <sub>2</sub>	5	10	Diffuse
CO	10	0	
NO <sub>2</sub>	10	0	
Methanol	100	0	

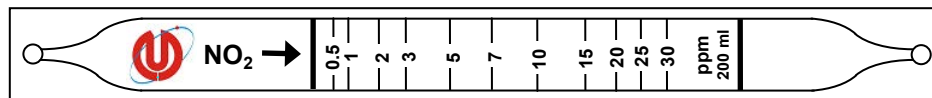
# Nitrogen Dioxide NO<sub>2</sub>

TWA (TLV): 3 ppm

STEL (TLV): 5 ppm

# SND-2

Flammable Range: NA



Range Class	Extended	Standard	Extended
Measurement Range	Do not extend	0.5-30 ppm	Do not extend
No. of Pump Strokes		2 (200 mL)	
Correction Factor (CF <sub>V</sub> )*		1.0	
Sampling Time	1.5 minutes per pump stroke		
Color Change	White → Yellow		
Shelf Life	2 years		
Active Reagent(s)	o-Tolidine		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C and 50% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response
CH <sub>4</sub>	25000	0
CO	3000	0
CO <sub>2</sub>	20%	0
H <sub>2</sub> S	100	0
SO <sub>2</sub>	200	0
Acetone	10000	0
Isobutylene	106	0.5
n-Hexane	100	0
Benzene	5	0
Toluene	100	0

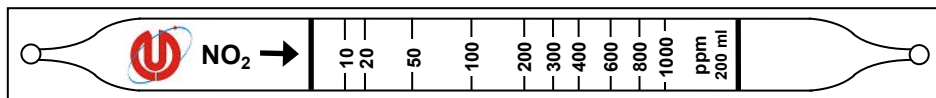
# Nitrogen Dioxide NO<sub>2</sub>

TWA (TLV): 3 ppm

STEL (TLV): 5 ppm

# SND-4

Flammable Range: NA



Range Class	Extended	Standard	Extended
Measurement Range	Do not extend	10-1000 ppm	Do not extend
No. of Pump Strokes		1 (100 mL)	
Correction Factor (CF <sub>v</sub> )*		1.0	
Sampling Time	1.5 minutes per pump stroke		
Color Change	White → Yellow		
Shelf Life	2 years		
Active Reagent(s)	o-Tolidine		

\* Multiply the observed reading by the correction factor (CF<sub>v</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C and 50% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response
CH <sub>4</sub>	25000	0
CO	3000	0
CO <sub>2</sub>	20%	0
H <sub>2</sub> S	100	0
SO <sub>2</sub>	200	0
Acetone	10000	0
Isobutylene	106	0.5
n-Hexane	100	0
Toluene	100	0

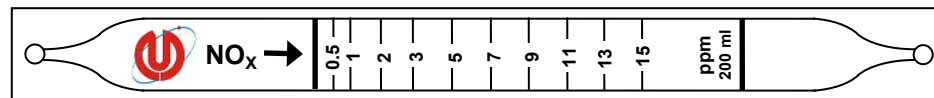
# Nitrogen Oxides NO<sub>x</sub>

TWA (TLV): 3 ppm (NO<sub>2</sub>) & 25 ppm (NO)

STEL (TLV): 5 ppm (NO<sub>2</sub>)

# SNO-2M

Flammable Range: NA



Range Class	Extended	Standard	Extended
Measurement Range	Do not extend	0.5-15 ppm	Do not extend
No. of Pump Strokes		2 (200 mL)	
Correction Factor (CF <sub>v</sub> )*		1.0	
Sampling Time	1.5 minutes per pump stroke		
Color Change	White → Light Yellow		
Shelf Life	2 years		
Active Reagent(s)	o-Tolidine		

\* Multiply the observed reading by the correction factor (CF<sub>v</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response
CH <sub>4</sub>	25000	0
CO	3000	≤0.5
CO <sub>2</sub>	20%	0.5
H <sub>2</sub> S	100	0
SO <sub>2</sub>	200	0.5
Acetone	10000	0

# Nitrogen Oxides NO<sub>x</sub>

TWA (TLV): 3 ppm (NO<sub>2</sub>) & 25 ppm (NO)

## SNO-4L

Flammable Range: NA%

### SPECIFICATION:

Measurement Range	Extended	Standard	Extended
	Do not extend	(10) - 250 ppm	Do not extend
No. of Pump Strokes		2 (200 mL)	
Volume Correction Factor (VCF)*		1.0	
Sampling Time	1.5 minutes per pump stroke (100 mL)		
Color Change	White → Yellowish orange		
Shelf Life	1 year		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	o-Tolidine		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

### CORRECTION FOR TEMPERATURE AND HUMIDITY:

**Temperature** - Not necessary between 0 - 40°C (32 - 104°F).

**Relative humidity** - Not necessary between 10 - 90 %.

### POSSIBLE INTERFERENCES:

Compound	Concentration (ppm)	Interference	Colour change / Comments
Cl <sub>2</sub>		+	White to Yellowish orange
Br <sub>2</sub>		+	White to Yellowish orange
H <sub>2</sub> S	100	No	No Effect
SO <sub>2</sub>	200	No	No Effect

# Nitrogen Oxides NO<sub>x</sub>

TWA (TLV): 3 ppm (NO<sub>2</sub>) & 25 ppm (NO)

## SNO-5M

Flammable Range: NA%

### SPECIFICATION:

Measurement Range	Extended	Standard	Extended
	Do not extend	100 - 2500 ppm	Do not extend
No. of Pump Strokes		1 (100 mL)	
Volume Correction Factor (VCF)*		1.0	
Sampling Time	1.5 minutes per pump stroke (100 mL)		
Color Change	White → Yellow with orange top		
Shelf Life	1 year		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	o-Tolidine		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

### CORRECTION FOR TEMPERATURE AND HUMIDITY:

**Temperature** - Not necessary between 0 - 40°C (32 - 104°F).

**Relative humidity** - Not necessary between 10 - 90 %.

### POSSIBLE INTERFERENCES:

Compound	Concentration (ppm)	Interference	Colour change / Comments
Cl <sub>2</sub>		+	White to Yellow with orange top
Br <sub>2</sub>		+	White to Yellow with orange top
H <sub>2</sub> S	100	No	No Effect
SO <sub>2</sub>	200	No	No Effect

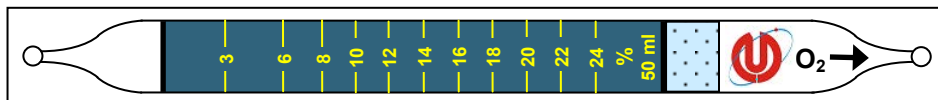
# Oxygen O<sub>2</sub>

TWA (TLV): NA

STEL (TLV): NA

# SOX-9M

Flammable Range: NA



Range Class	Extended	Standard	Extended
Measurement Range	1.5-12%	3-24%	
No. of Pump Strokes	1 (100 mL)	0.5 (50 mL)	
Correction Factor (CF <sub>v</sub> )*	0.5	1.0	
Sampling Time	3 minutes for ½ pump stroke		
Color Change	Dark violet → White		
Shelf Life	2 years		
Active Reagent(s)	Titanium chloride		

\* Multiply the observed reading by the correction factor (CF) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (%)	Apparent Response
CO <sub>2</sub>	20	0
H <sub>2</sub> S	4.7	0

## NOTE:

These tubes are about 50% longer than the regular tubes. The diagram is not to scale.

## NOTE:

HCl is generated by the reaction of oxygen with TiCl<sub>3</sub> on the tube. This HCl is trapped in the light blue post layer to prevent exposure of the pump and operator to acid.

## CAUTION:

This tube gets **HOT** during sampling. Keep hands protected and do not use the tube in potentially flammable atmospheres.

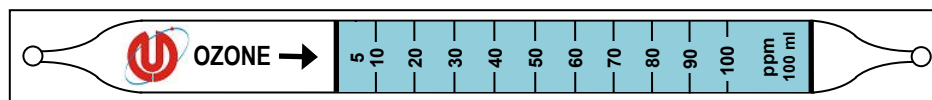
# Ozone O<sub>3</sub>

TWA (TLV): 0.1 ppm

STEL (TLV): 0.2 ppm (2 hours)

# SOZ-3

Flammable Range: NA



Range Class	Extended	Standard	Extended
Measurement Range	2.5-50 ppm	5-100 ppm	10-200 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>v</sub> )*	0.5	1.0	2.0
Sampling Time	1 minutes per pump stroke		
Color Change	Blue → White		
Shelf Life	2 years		
Active Reagent	Indigo indicator		

\* Multiply the observed reading by the correction factor (CF<sub>v</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C and 50% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	Comments
Cl <sub>2</sub>	7.7	5	Reddish
NO <sub>2</sub>	200	≤1	
CO	100	≤1	
H <sub>2</sub> S	120	≤1	Light blue
SO <sub>2</sub>	100	0	

Other oxidizing gases including, bromine and chlorine dioxide give a positive response.

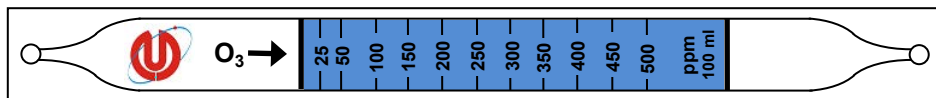
# Ozone O<sub>3</sub>

TWA (TLV): 0.1 ppm

STEL (TLV): 0.2 ppm (2 hours)

# SOZ-4M

Flammable Range: NA



Range Class	Extended	Standard	Extended
Measurement Range	12.5-250 ppm	25-500 ppm	50-1000 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2.0
Sampling Time	1.5 minutes per pump stroke		
Color Change	Blue → Yellow		
Shelf Life	2 years		
Active Reagent	Indigo indicator		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C and 50% RH.

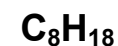
## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response
NO <sub>2</sub>	3.4	0
CH <sub>4</sub>	70000	0
SO <sub>2</sub>	100	0
Isobutylene	106	0

Other oxidizing gases including chlorine, bromine and chlorine dioxide give a positive response.

# n-Octane

TWA (TLV): 300 ppm



STEL (TLV): NA

# SOC-5

Flammable Range: 0.8 -6.5%

## Specification:

	Extended	Standard	Extended
Measurement Range	Do not extend	3 – 23 mg/L	Do not extend
No. of Pump Strokes		1 (100 mL)	
Volume Correction Factor (VCF)*		1.0	
Sampling Time	1.5 minutes per pump stroke (100 mL)		
Color Change	Orange → Brownish green		
Shelf Life	1 year		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Reaction Principle	C <sub>8</sub> H <sub>18</sub> + Cr <sup>6+</sup> + H <sub>2</sub> SO <sub>4</sub> → Cr <sup>3+</sup>		
Relative standard deviation	± 10 %		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## Possible Interferences:

Compound	Concentration (%)	Interference	Colour change / Comments
Organic vapours		+	Brownish Green

## Other Measurable Compounds:

Compound	Correction Factor	No. of pump strokes	Measuring range
n – Hexane	0.19	1	0.57 to 4.37 mg/L
Cyclohexane	0.22	1	0.66 to 5.06 mg/L
n – Heptane	0.47	1	1.41 to 10.81 mg/L

## Correction for Environmental Parameters:

Temperature	Not necessary between 0 - 40°C (32 - 104°F).
Relative humidity	Not necessary between 10 - 90 %.

# Phenol

TWA (TLV): 5 ppm



STEL (TLV): NA

# SPE-2M

Flammable Range: 3 - 10%

# Phosgene Cl2C=O

TWA (TLV): 0.1 ppm

Ceiling (REL): 0.2 ppm

# SPG-1

Flammable Range: NA

## SPECIFICATION:

Measurement Range	Extended	Standard	Extended
Measurement Range	0.5 – 12.5 ppm	1 - 25 ppm	2 - 50 ppm
No. of Pump Strokes	4 (400 mL)	2 (200 mL)	1 (100 mL)
Volume Correction Factor (VCF)*	0.5	1.0	2.0
Sampling Time	2.0 minutes per pump stroke (100 mL)		
Color Change	Yellow → Gray		
Shelf Life	1 year		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Ammonium ceric nitrate		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

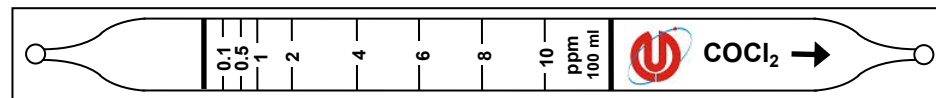
## CORRECTION FOR TEMPERATURE AND HUMIDITY:

**Temperature:** - Not necessary between 0- 40°C (32 - 104°F).

**Relative humidity:** - Not necessary between 10-90 %RH.

## POSSIBLE INTERFERENCES:

Compound	Concentration (ppm)	Interference	Colour change / Comments
Cresol		+	Yellow to Gray
NH <sub>3</sub>	500	No	No Effect



Range Class	Extended	Standard	Extended
Measurement Range	Do not extend	0.1-10 ppm	0.2-20 ppm
No. of Pump Strokes		1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>V</sub> )*		1.0	2.0
Sampling Time	2 minutes per pump stroke		
Color Change	White → Pink		
Shelf Life	1 year (Refrigeration at ≤45°F (7°C) required)		
Active Reagent	Nitrobenzyl pyridine and benzyl aniline		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C and 50% RH. No effect 10-90% RH.

<b>Temperature:</b>	50°F	68°F	86°F	104°F
<b>Correction Factor (CF<sub>T</sub>):</b>	0.86	1.0	1.1	1.2
<b>Temperature:</b>	10°C	20°C	30°C	40°C

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>•CF<sub>T</sub>) to obtain the true concentration.

## CROSS-SENSITIVITIES:

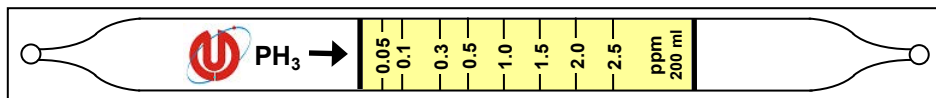
Compound	Conc. (ppm)	Apparent Response
Cl <sub>2</sub>	5	0
HCl	10	0
SO <sub>2</sub>	100	0

# Phosphine PH<sub>3</sub> SPH-1L

TWA (TLV): 0.3 ppm

STEL (TLV): 1 ppm

Flammable Range: 2-100%



Range Class	Extended	Standard	Extended
Measurement Range		0.05-2.5 ppm	0.1-5.0 ppm
No. of Pump Strokes		2 (200 mL)	1 (100 mL)
Correction Factor (CF <sub>V</sub> )*		1.0	2.0
Sampling Time	1.5 minutes per pump stroke		
Color Change	Yellow → Pink		
Shelf Life	2 years		
Active Reagent(s)	Mercuric chloride		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

## CROSS-SENSITIVITIES:

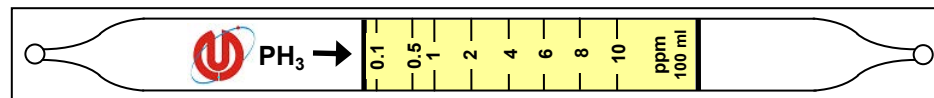
Compound	Conc. (ppm)	Apparent Response	Comments
CH <sub>4</sub>	25000	0	
CO	100	0	
CO <sub>2</sub>	50000	0.05	
NH <sub>3</sub>	100	≤0.05	
H <sub>2</sub> S	50	>2.5	Over range
SO <sub>2</sub>	200	0	
n-Hexane	1500	≤0.05	
Toluene	100	0	

# Phosphine PH<sub>3</sub> SPH-1

TWA (TLV): 0.3 ppm

STEL (TLV): 1 ppm

Flammable Range: 2-100%



Range Class	Extended	Standard	Extended
Measurement Range	0.05-5 ppm	0.1-10 ppm	0.2-20 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Factor Correction (CF <sub>V</sub> )*	0.5	1.0	2.0
Sampling Time	1.5 minutes per pump stroke		
Color Change	Yellow → Pink		
Shelf Life	2 years		
Active Reagent(s)	Mercuric chloride		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 40-60% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	Comments
CH <sub>4</sub>	25000	0	
CO	100	0	
CO <sub>2</sub>	50000	0.05	
NH <sub>3</sub>	100	≤0.1	
H <sub>2</sub> S	50	>2.5	Interferes
SO <sub>2</sub>	200	0	
n-Hexane	1500	≤0.05	
Toluene	100	0	

# Phosphine

TWA (TLV): 0.3 ppm



STEL (TLV): 1 ppm

# SPH-3

Flammable Range: ~1.8 - 100%

## SPECIFICATION:

Measurement Range	Extended	Standard	Extended
Measurement Range	2.5 – 50 ppm	5 – 100 ppm	10 – 200 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	½ (50 mL)
Volume Correction Factor (VCF)*	0.5	1.0	2.0
Sampling Time	1.5 minutes per pump stroke (100 mL)		
Color Change	Off white → Dark brown		
Shelf Life	2 years		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Gold compound		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## CORRECTION FOR TEMPERATURE AND HUMIDITY:

Temperature: - Not necessary between 0- 40°C (32 - 104°F).

Relative humidity: - Not necessary between 10 - 90 %RH.

## POSSIBLE INTERFERENCES:

Compound	Concentration (ppm)	Interference	Colour change / Comments
Arsine		+	Off white to Dark brown
SO <sub>2</sub>	200	No	No Effect
H <sub>2</sub> S		+	Off white to Dark brown

# Phosphine

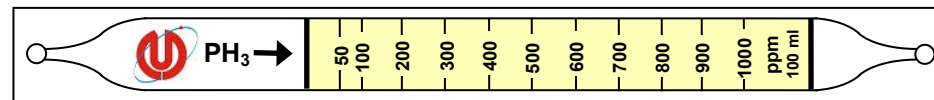
TWA (TLV): 0.3 ppm



STEL (TLV): 1 ppm

# SPH-4

Flammable Range: 2-100%



Range Class	Extended	Standard	Extended
Measurement Range	25-500 ppm	50-1000 ppm	100-2000 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Correction Factor (CF <sub>v</sub> )*	0.5	1.0	2.0
Sampling Time	1 minute per pump stroke		
Color Change	Yellow → Dark purple		
Shelf Life	3 years		
Active Reagent	Gold		

\* Multiply the observed reading by the correction factor (CF<sub>v</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

## CROSS-SENSITIVITIES:

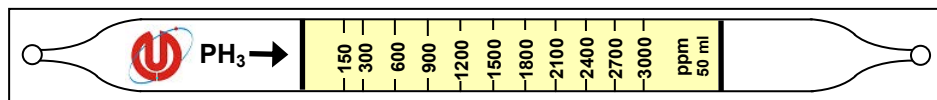
Compound	Conc. (ppm)	Apparent Response
CH <sub>4</sub>	25000	0
CO	250	0
CO <sub>2</sub>	50000	0
NH <sub>3</sub>	100	≤10
NO	100	0
H <sub>2</sub> S	50	40
SO <sub>2</sub>	200	0
n-Hexane	1500	0
Toluene	100	0

# Phosphine PH<sub>3</sub> SPH-5

TWA (TLV): 0.3 ppm

STEL (TLV): 1 ppm

Flammable Range: 2-100%



Range Class	Extended	Standard	Extended
Measurement Range	75-1500 ppm	150-3000 ppm	Do not extend
No. of Pump Strokes	1 (100 mL)	0.5 (50 mL)	
Correction Factor (CF <sub>v</sub> )*	0.5	1.0	
Sampling Time	1 minute per ½ pump stroke		
Color Change	Yellow → Black		
Shelf Life	3 years		
Active Reagent	Gold		

\* Multiply the observed reading by the correction factor (CF<sub>v</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response
CH <sub>4</sub>	25000	0
CO	250	0
CO <sub>2</sub>	50000	0
NH <sub>3</sub>	100	0
NO	100	0
H <sub>2</sub> S	200	90
SO <sub>2</sub>	3000	0
n-Hexane	1500	0
Toluene	100	0

# Phosphine PH<sub>3</sub> SPH-6M

TWA (TLV): 0.3 ppm

STEL (TLV): 1 ppm

Flammable Range: ~1.8 - 100%

## SPECIFICATION:

	Extended	Standard	Extended
Measurement Range	Do not extend	300 -8000 ppm	Do not extend
No. of Pump Strokes		1/2 (50 mL)	
Volume Correction Factor (VCF)*		1.0	
Sampling Time	1 minute per pump 1/2 stroke (50 mL)		
Color Change	Yellow → Black		
Shelf Life	1 year		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Gold compound		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## CORRECTION FOR TEMPERATURE AND HUMIDITY:

Temperature: - Not necessary between 0 - 40°C (32 - 104°F).

Relative humidity: - Not necessary between 10 - 90 %RH.

## POSSIBLE INTERFERENCES:

Compound	Concentration (ppm)	Interference	Colour change / Comments
Arsine		+	Yellow to Black
SO <sub>2</sub>	3000	No	No Effect
H <sub>2</sub> S		+	Yellow to Black

# Pyridine

TWA (TLV): 1.0 ppm



STEL (TLV): NA

# SPY-2M

Flammable Range: 1.8-12.4%

# Stoddard Solvent

TWA (TLV): 100 mg/m<sup>3</sup>

STEL (TLV): NA Flammable Range: 0.8 % or higher

# SSS-5M

## Specification:

Measurement Range	Extended	Standard	Extended
	Do Not Extend	1 - 14 ppm	Do Not Extend
No. of Pump Strokes		1 (100 mL)	
Volume Correction Factor (VCF)*		1.0	
Sampling Time	1.5 minutes per pump stroke (100 mL)		
Color Change	Purple → Pale Yellow		
Shelf Life	2 years		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Reaction Principle	C <sub>5</sub> H <sub>5</sub> N + Acid → Reaction product		
Relative standard deviation	± 10 %		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## Possible Interferences:

Compound	Concentration (ppm)	Interference	Colour change / Comments
Amines		+	Purple to Pale Yellow
Ammonia		+	Purple to Pale Yellow

## Correction for Environmental Parameters:

Temperature	Not necessary between 0 - 40°C (32 - 104°F).
Relative humidity	Not necessary between 10 - 90 %.

## SPECIFICATION:

Measurement Range	Extended	Standard	Extended
	Do not extend	50 - 8000 mg/m <sup>3</sup>	Do not extend
No. of Pump Strokes		1 (100 mL)	
Volume Correction Factor (VCF)*		1.0	
Sampling Time	1 minute per pump stroke (100 mL)		
Color Change	White → Brownish green		
Shelf Life	1 year		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Iodine Pentoxide		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## CORRECTION FOR TEMPERATURE AND HUMIDITY:

Temperature - Not necessary between 0 - 40°C (32 - 104°F).

Relative humidity - Not necessary between 10 - 90 %.

## POSSIBLE INTERFERENCES:

Compound	Concentration (ppm)	Interference	Colour change / Comments
Hexane		+	Brownish green (Whole layer)
CO	1000	No	No Effect
Acetone	1500	No	No Effect

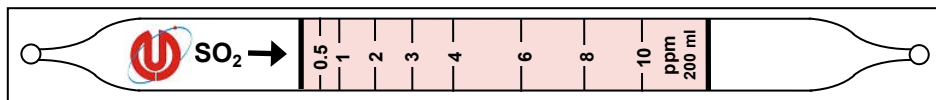
# Sulphur Dioxide SO<sub>2</sub>

TWA (TLV): 2 ppm

STEL (TLV): 5 ppm

## SSD-1

Flammable Range: NA



Range Class	Extended	Standard	Extended
Measurement Range	0.25-5	0.5-10 ppm	1-20 ppm
No. of Pump Strokes	4 (400 mL)	2 (200 mL)	1 (100 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2
Sampling Time	1 minute per pump stroke		
Color Change	Pink → Yellow		
Shelf Life	1 year		
Active Reagent	Acid/base pH change		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

### TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

### CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	Comments
CH <sub>4</sub>	25000	≤0.5	
CO	14800	0.5	
CO <sub>2</sub>	50000	≤0.5	
NH <sub>3</sub>	100	0	
H <sub>2</sub> S	2000	0	Slight color change
Isobutylene	106	0	
n-Hexane	1500	0.5	
Toluene	400	0	

# Sulphur Dioxide SO<sub>2</sub>

TWA (TLV): 2 ppm

STEL (TLV): 5 ppm

## SSD-2M

Flammable Range: NA

### SPECIFICATION:

Measurement Range	Extended	Standard	Extended
	0.5 – 12.5	1 - 25 ppm	2 - 50 ppm
No. of Pump Strokes	4 (400 mL)	2 (200 mL)	1 (200 mL)
Volume Correction Factor (VCF)*	0.5	1.0	2
Sampling Time	1.5 minutes per pump stroke (100 mL)		
Color Change	Light blue → Yellow		
Shelf Life	2 years		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Barium chloride		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

### CORRECTION FOR TEMPERATURE AND HUMIDITY:

Temperature - Not necessary between 0 - 40°C (32 - 104°F).

Relative humidity - Not necessary between 10 - 90 %.

### POSSIBLE INTERFERENCES:

Compound	Concentration (ppm)	Interference	Colour change / Comments
H <sub>2</sub> S		+	Beige colour
HF		+	Ring
NO		+	Diffuse
CO	100	No	No effect
NH <sub>3</sub>	50	No	No effect

# Sulphur Dioxide $\text{SO}_2$

TWA (TLV): 2 ppm

STEL (TLV): 5 ppm

# SSD-3

Flammable Range: NA

# Sulphur Dioxide $\text{SO}_2$

TWA (TLV): 2 ppm

STEL (TLV): 5 ppm

# SSD-4M

Flammable Range: NA

## SPECIFICATION:

	Extended	Standard	Extended
Measurement Range	2.5 – 50	5 - 100 ppm	10 - 200 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Volume Correction Factor (VCF)*	0.5	1.0	2
Sampling Time	2.0 minutes per pump stroke (100 mL)		
Color Change	Blue → Yellow		
Shelf Life	2 years		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Barium chloride		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## CORRECTION FOR TEMPERATURE AND HUMIDITY:

**Temperature** - Not necessary between 0 - 40°C (32 - 104°F).

**Relative humidity** - Not necessary between 10 - 90 %.

## POSSIBLE INTERFERENCES:

Compound	Concentration (ppm)	Interference	Colour change / Comments
H <sub>2</sub> S		+	Beige colour
HF		+	Ring
NO		+	Diffuse
CO	3000	No	No effect
NH <sub>3</sub>	300	No	No effect

## SPECIFICATION:

	Extended	Standard	Extended
Measurement Range	10 – 150	20 - 300 ppm	40 - 600 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Volume Correction Factor (VCF)*	0.5	1.0	2
Sampling Time	1.5 minutes per pump stroke (100 mL)		
Color Change	Blue → Yellow		
Shelf Life	2 years		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Barium chloride, pH Indicator		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## CORRECTION FOR TEMPERATURE AND HUMIDITY:

**Temperature** - Not necessary between 0 - 40°C (32 - 104°F).

**Relative humidity** - Not necessary between 10 - 90 %.

## POSSIBLE INTERFERENCES:

Compound	Concentration (ppm)	Interference	Colour change / Comments
H <sub>2</sub> S		+	Beige colour
HF		+	Ring
NO		+	Diffuse
CO	3000	No	No effect
NH <sub>3</sub>	300	No	No effect

# Sulphur Dioxide SO<sub>2</sub>

TWA (TLV): 2 ppm

STEL (TLV): 5 ppm

# SSD-5

Flammable Range: NA

# Sulphur Dioxide SO<sub>2</sub>

TWA (TLV): 2 ppm

STEL (TLV): 5 ppm

# SSD-6 M

Flammable Range: NA

## SPECIFICATION:

Measurement Range	Extended	Standard	Extended
	Do not extend	0.02 – 0.3 %	Do not extend
No. of Pump Strokes		1 (100 mL)	
Volume Correction Factor (VCF)*		1.0	
Sampling Time	1 minute per pump stroke (100 mL)		
Color Change	Yellow → Pale blue		
Shelf Life	2 years		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Chromium (VI) compound		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## CORRECTION FOR TEMPERATURE AND HUMIDITY:

**Temperature** - Not necessary between 0 - 40°C (32 - 104°F).

**Relative humidity** - Not necessary between 10 - 90 %.

## POSSIBLE INTERFERENCES:

Compound	Concentration (ppm)	Interference	Colour change / Comments
H <sub>2</sub> S		+	Slight ring
CO		+	Slight colour change
CO <sub>2</sub>	0.3%	No	No Effect

## SPECIFICATION:

Measurement Range	Extended	Standard	Extended
	250 – 4000	500 - 8000 ppm	1000 - 16000 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Volume Correction Factor (VCF)*	0.5	1.0	2
Sampling Time	1.5 minutes per pump stroke (100 mL)		
Color Change	Yellow → Green		
Shelf Life	2 years		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Chromium (VI) compound		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## CORRECTION FOR TEMPERATURE AND HUMIDITY:

**Temperature** - Not necessary between 0 - 40°C (32 - 104°F).

**Relative humidity** - Not necessary between 10 - 90 %.

## POSSIBLE INTERFERENCES:

Compound	Concentration (ppm)	Interference	Colour change / Comments
H <sub>2</sub> S		+	Slight ring
CO		+	Slight colour change
CO <sub>2</sub>	0.3%	No	No Effect

# Sulphur Dioxide $\text{SO}_2$

TWA (TLV): 2 ppm

STEL (TLV): 5 ppm

# SSD-7M

Flammable Range: NA

# Sulphur Dioxide $\text{SO}_2$

TWA (TLV): 2 ppm

STEL (TLV): 5 ppm

# SSD-7

Flammable Range: NA

## SPECIFICATION:

Measurement Range	Extended	Standard	Extended
	0.05 - 1.5 %	0.1 - 3 %	0.2 - 6%
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Volume Correction Factor (VCF)*	0.5	1.0	2.0
Sampling Time	1 minute per pump stroke (100 mL)		
Color Change	Yellow → Green		
Shelf Life	2 years		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Chromium (VI) compound		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## CORRECTION FOR TEMPERATURE AND HUMIDITY:

**Temperature** - Not necessary between 0 - 40°C (32 - 104°F).

**Relative humidity** - Not necessary between 10 - 90 %.

## POSSIBLE INTERFERENCES:

Compound	Concentration (ppm)	Interference	Colour change / Comments
H <sub>2</sub> S		+	Slight ring
CO		+	Slight colour change
CO <sub>2</sub>	3%	No	No Effect

## SPECIFICATION:

Measurement Range	Extended	Standard	Extended
	0.125 - 2.5 %	0.25 - 5 %	0.5 - 10%
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Volume Correction Factor (VCF)*	0.5	1.0	2.0
Sampling Time	1 minute per pump stroke (100 mL)		
Color Change	Orange → Pale blue		
Shelf Life	2 years		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Chromium (VI) compound		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## CORRECTION FOR TEMPERATURE AND HUMIDITY:

**Temperature** - Not necessary between 0 - 40°C (32 - 104°F).

**Relative humidity** - Not necessary between 10 - 90 %.

## POSSIBLE INTERFERENCES:

Compound	Concentration (ppm)	Interference	Colour change / Comments
H <sub>2</sub> S		+	Slight ring
CO		+	Slight colour change
CO <sub>2</sub>	5%	No	No Effect
NH <sub>3</sub>		+	Orange to Pale blue
NO <sub>2</sub>	1500	No	No Effect

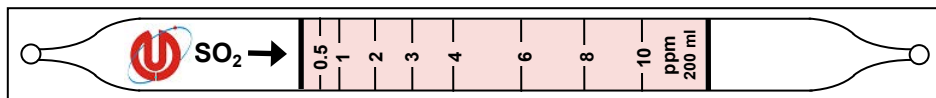
# Sulphur Dioxide SO<sub>2</sub>

TWA (TLV): 2 ppm

STEL (TLV): 5 ppm

Flammable Range: NA

## SSD-1



Range Class	Extended	Standard	Extended
Measurement Range	0.25-5	0.5-10 ppm	1-20 ppm
No. of Pump Strokes	4 (400 mL)	2 (200 mL)	1 (100 mL)
Correction Factor (CF <sub>V</sub> )*	0.5	1.0	2
Sampling Time	1 minute per pump stroke		
Color Change	Pink → Yellow		
Shelf Life	1 year		
Active Reagent	Acid/base pH change		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

### TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

### CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	Comments
CH <sub>4</sub>	25000	≤0.5	
CO	14800	0.5	
CO <sub>2</sub>	50000	≤0.5	
NH <sub>3</sub>	100	0	
H <sub>2</sub> S	2000	0	Slight color change
Isobutylene	106	0	
n-Hexane	1500	0.5	
Toluene	400	0	

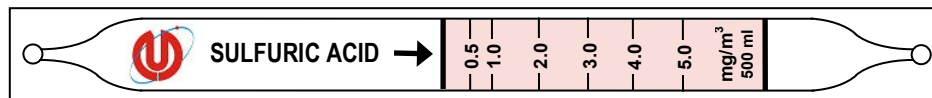
# Sulphuric Acid H<sub>2</sub>SO<sub>4</sub>

TWA (TLV): 1 mg/m<sup>3</sup>

STEL (TLV): 3 mg/m<sup>3</sup>

Flammable Range: NA

## SSA-1L



Range Class	Extended	Standard	Extended
Measurement Range	Do not extend	0.5-5.0 mg/m <sup>3</sup>	Do not extend
No. of Pump Strokes		5 (500 mL)	
Correction Factor (CF <sub>V</sub> )*		1.0	
Sampling Time	1 minute per pump stroke		
Color Change	Pink → Yellow		
Shelf Life	1 year		
Active Reagent(s)	Acid/base pH change		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

### TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F) and 50% RH.

### CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Conc. (mg/m <sup>3</sup> )	Apparent Response	CF <sub>X</sub> *	Comments
HCl	13	20	3 mg/m <sup>3</sup>	7	
HF	12.5	10	0.5 mg/m <sup>3</sup>		
H <sub>2</sub> S	3	4.2	0.3 mg/m <sup>3</sup>		Beige color
CO	100		0		
NH <sub>3</sub>	50		0		Interferes in mixtures

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>X</sub>) to obtain the true concentration.

# Tetrahydrofuran $C_4H_8O$

TWA (TLV): 200 ppm

STEL (TLV): 250 ppm

# STH-4

Flammable Range: 2 – 11.8 %

## SPECIFICATION:

Measurement Range	Extended	Standard	Extended
	Do not extend	50 - 800 ppm	Do not extend
No. of Pump Strokes		1 (100 mL)	
Volume Correction Factor (VCF)*		1.0	
Sampling Time	3.5 minutes per pump stroke (100 mL)		
Color Change	Yellow → Green		
Shelf Life	1 year		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Chromium (VI) compound		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## CORRECTION FOR TEMPERATURE AND HUMIDITY:

**Temperature** - Not necessary between 0 - 40°C (32 - 104°F).

**Relative humidity** - Not necessary between 10 - 90 %.

## POSSIBLE INTERFERENCES:

Compound	Concentration (ppm)	Interference	Colour change / Comments
Methanol		+	Yellow to Green
Ethanol		+	Yellow to Green

# Tetrachloroethylene $Cl_2C:CCl_2$ STE-3

TWA (TLV): 25 ppm

STEL (TLV): 100 ppm

Flammable Range: 10-16%

## SPECIFICATION:

Measurement Range	Extended	Standard	Extended
	5 – 50 ppm	10 – 100 ppm	20 – 200 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Volume Correction Factor (VCF)*	0.5	1.0	2.0
Sampling Time	1.5 minutes per pump stroke (100 mL)		
Color Change	White → Yellow		
Shelf Life	1 year		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Chromium trioxide, o-Tolidine		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## CORRECTION FOR TEMPERATURE AND HUMIDITY:

**Temperature** - Not necessary between 0 - 40°C (32 - 104°F).

**Relative humidity** - Not necessary between 10 - 90 %.

## POSSIBLE INTERFERENCES:

Compound	Concentration (ppm)	Interference	Colour change / Comments
1,2 Dichloroethylene		+	White to Yellow
$Cl_2$		+	White to Yellow
HCl		+	White to Yellow

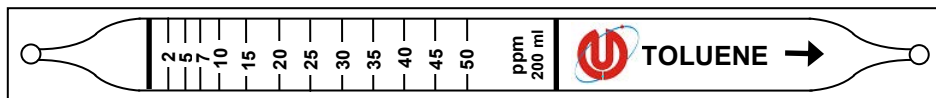
# Toluene C<sub>7</sub>H<sub>8</sub>

TWA (TLV): 50 ppm

STEL (TLV): NA

Flammable Range: 1-7%

## STO-2



Range Class	Extended	Standard	Extended
Measurement Range	Do not extend	2-50 ppm	Do not extend
No. of Pump Strokes		2 (200 mL)	
Correction Factor (CF <sub>V</sub> )*		1.0	
Sampling Time	2 minutes per pump stroke		
Color Change	White → Brown		
Shelf Life	2 years		
Active Reagent(s)	Iodine pentoxide		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

### TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

### CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>X</sub> *	Comments
CH <sub>4</sub>	25000	0		
CO	100	0		Faint beige entire tube
CO <sub>2</sub>	10%	≤1		
NH <sub>3</sub>	1000	0		
SO <sub>2</sub>	30	0		
Xylenes	30	17.5	1.7	
Isobutylene	106	≤2		Very pale brown
n-Hexane	50	0		
Styrene	50	6		Dark to 2, faint to 6

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>X</sub>) to obtain the true concentration.

# Toluene

TWA (TLV): 50 ppm

STEL (TLV): NA

## STO-4M

Flammable Range: 1-7%

### SPECIFICATION:

Measurement Range	Extended	Standard	Extended
Measurement Range	Do not extend	10 - 300 ppm	Do not extend
No. of Pump Strokes		1 (100 mL)	
Volume Correction Factor (VCF)*		1.0	
Sampling Time	1.5 minutes per pump stroke (100 mL)		
Color Change	White → Brown		
Shelf Life	2 years		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Iodine pentoxide		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

### CORRECTION FOR TEMPERATURE AND HUMIDITY:

Temperature - Not necessary between 0 - 40°C (32 - 104°F).

Relative humidity - Not necessary between 10 - 90 %.

### POSSIBLE INTERFERENCES:

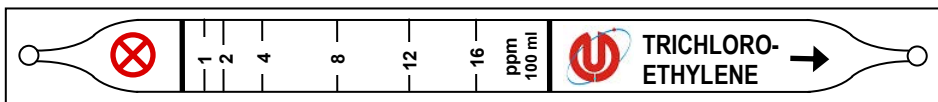
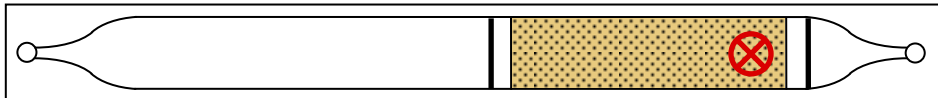
Compound	Concentration (ppm)	Interference	Colour change / Comments
H <sub>2</sub> S		+	Faint ring
CO		+	Faint ring
n - Hexane		+	Ring
Xylene		+	White to Brown
NH <sub>3</sub>	50000	No	No effect
SO <sub>2</sub>	2000	No	No effect
Isobutylene	106	No	No effect

# Trichloroethylene $\text{CCl}_2=\text{CHCl}$ SCE-2M

TWA (TLV): 10 ppm

STEL (TLV): 25 ppm

Flammable Range: 8-12%



Range Class	Extended	Standard	Extended
<b>Measurement Range</b>	0.5-8 ppm	1-16 ppm	2-32 ppm
<b>No. of Pump Strokes</b>	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
<b>Correction Factor (CF<sub>V</sub>)*</b>	0.5	1.0	2.0
<b>Sampling Time</b>	3 minutes per pump stroke		
<b>Color Change</b>	White → Light violet		
<b>Shelf Life</b>	1 year		
<b>Active Reagent(s)</b>	Chromium trioxide, 3,3-dimethylnaphthadine		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 0-40°C (32-104°F) and 10-90% RH.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	CF <sub>x</sub> *	Comments
Tetrachloroethylene	30	8	3.8	
Vinyl chloride	25	16	1.6	
1,2-Dichloroethane	12	0		

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>x</sub>) to obtain the true concentration.

# Trichloroethylene $\text{Cl}_2\text{C}:\text{CHCl}$ SCE-4L

TWA (TLV): 50 ppm

STEL (TLV): 100 ppm

Flammable Range: NA

## SPECIFICATION:

Measurement Range	Extended	Standard	Extended
	Do not extend	20 – 250 ppm	Do not extend
<b>No. of Pump Strokes</b>	2 (200 mL)		
<b>Volume Correction Factor (VCF)*</b>	1.0		
<b>Sampling Time</b>	1.5 minutes per pump stroke (100 mL)		
<b>Color Change</b>	White → Yellow		
<b>Shelf Life</b>	1 year		
<b>Storage condition</b>	Below 10°C (50°F)		
<b>Calibration condition</b>	Calibrated at 20°C (68°F) and 50% RH.		
<b>Active Reagent(s)</b>	Chromium trioxide, o-Tolidine		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## CORRECTION FOR TEMPERATURE AND HUMIDITY:

**Temperature** - Not necessary between 0 - 40°C (32 - 104°F).

**Relative humidity** - Not necessary between 10 - 90 %.

## POSSIBLE INTERFERENCES:

Compound	Concentration (ppm)	Interference	Colour change / Comments
1,2 Dichloroethylene		+	White to Yellow
Cl <sub>2</sub>		+	White to Yellow
HCl		+	White to Yellow

# Trichloroethylene $\text{Cl}_2\text{C}:\text{CHCl}$

TWA (TLV): 50 ppm

STEL (TLV): 100 ppm

# SCE-6

Flammable Range: NA

# t-Butyl Mercaptan $\text{C}_4\text{H}_9\text{SH}$

TWA (TLV): 0.5 ppm

STEL (TLV): NA

# SBM-1

Flammable Range: NA

## SPECIFICATION:

Measurement Range	Extended	Standard	Extended
	Do not extend	0.05 – 1 %	Do not extend
No. of Pump Strokes		1 (100 mL)	
Volume Correction Factor (VCF)*		1.0	
Sampling Time	1.5 minutes per pump stroke (100 mL)		
Color Change	White → Yellowish brown		
Shelf Life	1 year		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Iodine Pentoxide		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## CORRECTION FOR TEMPERATURE AND HUMIDITY:

**Temperature** - Not necessary between 0 - 40°C (32 - 104°F).

**Relative humidity** - Not necessary between 40 - 60 %.

## POSSIBLE INTERFERENCES:

Compound	Concentration (ppm)	Interference	Colour change / Comments
Acetylene		+	White to Brown
CO		+	White to Brown
Tetrachloroethylene		+	White to Yellowish brown
1,1,1 Trichloroethylene		+	White to Yellowish brown
Toluene		+	Brown

## SPECIFICATION:

Measurement Range	Extended	Standard	Extended
	Do not extend	0.5-30 mg/m <sup>3</sup>	Do not extend
No. of Pump Strokes		2 (200 mL)	
Volume Correction Factor (VCF)*		1.0	
Sampling Time	1 minute per pump stroke (100 mL)		
Color Change	Yellow → Pink		
Shelf Life	1 year		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Mercuric chloride		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## CORRECTION FOR TEMPERATURE AND HUMIDITY:

**Temperature** - Not necessary between 0 - 40°C (32 - 104°F).

**Relative humidity** - Not necessary between 10 - 90 %RH.

## POSSIBLE INTERFERENCES:

Compound	Concentration (mg/m <sup>3</sup> )	Interference	Colour change / Comments
Mercaptans		+	Yellow to Pink
CO <sub>2</sub>	100	No	No effect
H <sub>2</sub> S		+	Yellow to Pink
NH <sub>3</sub>	15	No	No effect
PH <sub>3</sub>		+	Yellow to Pink
SO <sub>2</sub>	30	No	No effect

## OTHER MEASURABLE COMPOUNDS:

Compound	Correction Factor	No. of pump strokes	Measuring range
Ethyl Mercaptan	1	2	0.5 - 30 mg/m <sup>3</sup>
Methyl Mercaptan	1	2	0.5 - 30 mg/m <sup>3</sup>

# t-Butyl Mercaptan $C_4H_9SH$

TWA (TLV): 0.5 ppm

STEL (TLV): NA

# SBM-1M

Flammable Range: NA

# t-Butyl Mercaptan $C_4H_9SH$

TWA (TLV): 0.5 ppm

STEL (TLV): NA

# SBM-4L

Flammable Range: NA

## SPECIFICATION:

Measurement Range	Extended	Standard	Extended
	Do not extend	0.5-15 mg/m <sup>3</sup>	Do not extend
No. of Pump Strokes		3 (300 mL)	
Volume Correction Factor (VCF)*		1.0	
Sampling Time	1.5 minutes per pump stroke (100 mL)		
Color Change	Yellow → Pink		
Shelf Life	1 year		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Mercuric chloride		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## CORRECTION FOR TEMPERATURE AND HUMIDITY:

**Temperature** - Not necessary between 0 - 40°C (32 - 104°F).

**Relative humidity** - Not necessary between 10 - 90 %RH.

## POSSIBLE INTERFERENCES:

Compound	Concentration (mg/m <sup>3</sup> )	Interference	Colour change / Comments
Other Mercaptan		+	Yellow to Pink
CO <sub>2</sub>	100	-	No effect
H <sub>2</sub> S		+	Yellow to Pink
NH <sub>3</sub>	15	-	No effect
PH <sub>3</sub>		+	Yellow to Pink
SO <sub>2</sub>	30	-	No effect

## OTHER MEASURABLE COMPOUNDS:

Compound	Correction Factor	No. of pump strokes	Measuring range
Ethyl Mercaptan	1	3	0.5 - 15 mg/m <sup>3</sup>
Methyl Mercaptan	1	3	0.5 - 15 mg/m <sup>3</sup>

## SPECIFICATION:

Measurement Range	Extended	Standard	Extended
	2.5- 60 ppm	5-120 ppm	10- 240 ppm
No. of Pump Strokes	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
Volume Correction Factor (VCF)*	0.5	1.0	2.0
Sampling Time	1.5 minutes per pump stroke		
Color Change	Yellow → Pink		
Shelf Life	1 year		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Mercuric chloride		

\* Multiply the observed reading by the correction factor (VCF) to obtain the true concentration.

## CORRECTION FOR TEMPERATURE AND HUMIDITY:

**Temperature** - Not necessary between 0 - 40°C (32 - 104°F).

**Relative humidity** - Not necessary between 10 - 90 %..

## POSSIBLE INTERFERENCES:

Compound	Concentration (ppm)	Interference	Colour change
Mercaptans		+	Yellow to Pink
PH <sub>3</sub>		+	Yellow to Pink
H <sub>2</sub> S		+	Yellow to Pink
Arsine		+	Yellow to Pink
HCN		+	Yellow to Pink
NH <sub>3</sub>	100	No	No effect
SO <sub>2</sub>	30	No	No effect

## OTHER MEASURABLE COMPOUNDS:

Compound	Correction Factor	No. of pump strokes	Measuring range
Ethyl Mercaptan	1	1	5 - 120 ppm
Methyl Mercaptan	1	1	5 - 120 ppm

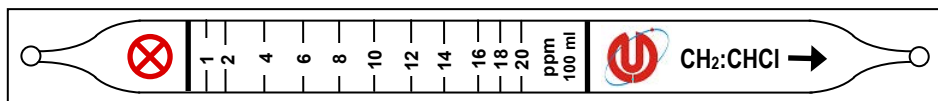
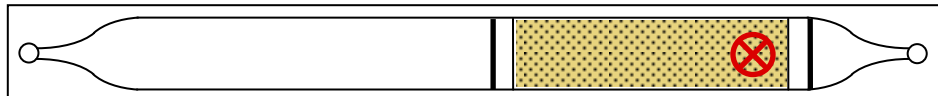
# Vinyl Chloride $\text{CH}_2=\text{CHCl}$

TWA (TLV): 1 ppm

STEL (TLV): NA

## SVC-2M

Flammable Range: 4-31%



Range Class	Extended	Standard	Extended
Measurement Range	Do not extend	1-20 ppm	Do not extend
No. of Pump Strokes		1 (100 mL)	
Correction Factor ( $\text{CF}_V$ )*		1.0	
Sampling Time	2 minutes per pump stroke		
Color Change	White → Yellow		
Shelf Life	1 year		
Active Reagent(s)	Chromium trioxide, o-Tolidine		

\* Multiply the observed reading by the correction factor ( $\text{CF}_V$ ) to obtain the true concentration.

### TEMPERATURE AND HUMIDITY EFFECTS:

Calibrated at 20°C (68°F). No correction necessary 10-90% RH.

### CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response	$\text{CF}_x$ *	Comments
Trichloroethylene	10	8	1.2	
Tetrachloroethane	60	15	4	
Ethylene	1000	0		
Benzene	600	0		

\* Multiply the observed reading by the correction factors ( $\text{CF}_V \cdot \text{CF}_x$ ) to obtain the true concentration.

# Vinyl Chloride $\text{CH}_2=\text{CHCl}$

TWA (TLV): 1 ppm

STEL (TLV): NA

## SVC-6

Flammable Range: 3.6 - 23%

### SPECIFICATION:

	Extended	Standard	Extended
Measurement Range	Do not extend	0.05 – 1 %	Do not extend
No. of Pump Strokes		1 (100 mL)	
Volume Correction Factor ( $\text{VCF}$ )*		1.0	
Sampling Time	1 minute per pump stroke (100 mL)		
Color Change	Orange → Brown		
Shelf Life	1 year		
Storage condition	Below 10°C (50°F)		
Calibration condition	Calibrated at 20°C (68°F) and 50% RH.		
Active Reagent(s)	Chromium (VI) compound		

\* Multiply the observed reading by the correction factor ( $\text{VCF}$ ) to obtain the true concentration.

### CORRECTION FOR TEMPERATURE AND HUMIDITY:

Temperature - Not necessary between 0 - 40°C (32 - 104°F).

Relative humidity - Not necessary between 10 - 90 %.

### POSSIBLE INTERFERENCES:

Compound	Concentration (%)	Interference	Colour change / Comments
Organic solvents		+	Orange to brownish green

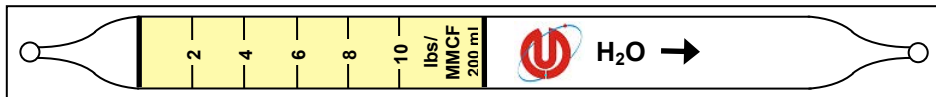
# Water Vapour H<sub>2</sub>O

TWA (TLV): NA

STEL (TLV): NA

# SWA-4L

Flammable Range: NA



Range Class	Extended	Standard	Extended
<b>Measurement Range</b>	1-5 lbs/MMCF	2-10 lbs/MMCF	4-20 lbs/MMCF
<b>No. of Pump Strokes</b>	4 (400 mL)	2 (200 mL)	1 (100 mL)
<b>Correction Factor (CF<sub>V</sub>)*</b>	0.5	1.0	2.0
<b>Sampling Time</b>	1.5 minutes per pump stroke (in air) 1 minute per pump stroke (in natural gas)		
<b>Color Change</b>	Yellow → Light Green		
<b>Shelf Life</b>	2 years		
<b>Active Reagent</b>	Magnesium perchlorate		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE EFFECTS:

Calibrated at 20°C (68°F).

Temperature:	50°F	68°F	86°F	104°F
<b>Correction Factor (CF<sub>T</sub>):</b>	1.3	1.0	0.73	0.45
Temperature:	10°C	20°C	30°C	40°C

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>T</sub>) to obtain the true concentration.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response
CH <sub>4</sub>	99.9%	0
CO	200	0
CO <sub>2</sub>	3000	0
H <sub>2</sub> S	2000	0
Methanol	50	0
Hexane	3000	0

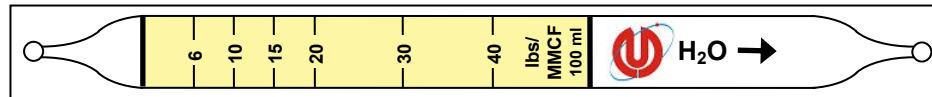
# Water Vapour H<sub>2</sub>O

TWA (TLV): NA

STEL (TLV): NA

# SWA-4

Flammable Range: NA



Range Class	Extended	Standard	Extended
<b>Measurement Range</b>	3-20 lbs/MMCF	6-40 lbs/MMCF	12-80 lbs/MMCF
<b>No. of Pump Strokes</b>	2 (200 mL)	1 (100 mL)	0.5 (50 mL)
<b>Correction Factor (CF<sub>V</sub>)*</b>	0.5	1.0	2.0
<b>Sampling Time</b>	1.5 minutes per pump stroke (in air) 1 minute per pump stroke (in natural gas)		
<b>Color Change</b>	Yellow → Dark Green		
<b>Shelf Life</b>	2 years		
<b>Active Reagent</b>	Magnesium perchlorate		

\* Multiply the observed reading by the correction factor (CF<sub>V</sub>) to obtain the true concentration.

## TEMPERATURE EFFECTS:

Calibrated at 20°C (68°F).

Temperature:	50°F	68°F	86°F	104°F
<b>Correction Factor (CF<sub>T</sub>):</b>	1.2	1.0	0.70	0.52
Temperature:	10°C	20°C	30°C	40°C

\* Multiply the observed reading by the correction factors (CF<sub>V</sub>·CF<sub>T</sub>) to obtain the true concentration.

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response
CH <sub>4</sub>	99.9%	0
CO	200	0
CO <sub>2</sub>	3000	0
H <sub>2</sub> S	2000	0
Methanol	50	0
Hexane	3000	0

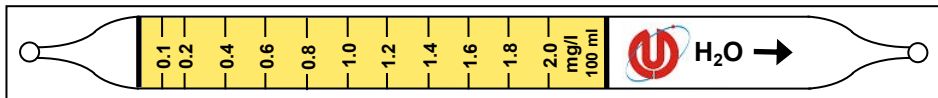
# Water Vapour H<sub>2</sub>O

TWA (TLV): NA

STEL (TLV): NA

## SWA-5

Flammable Range: NA



Range Class	Extended	Standard	Extended
Measurement Range	Do not extend	0.1-2 mg/L	Do not extend
No. of Pump Strokes		1 (100 mL)	
Correction Factor (CF <sub>v</sub> )*		1.0	
Sampling Time	1 minute per pump stroke		
Color Change	Yellow → Greenish Blue		
Shelf Life	2 years		
Active Reagent	Magnesium perchlorate		

\* Multiply the observed reading by the correction factor (CF<sub>v</sub>) to obtain the true concentration.

### TEMPERATURE EFFECTS:

Calibrated at 20°C (68°F).

### CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response
CH <sub>4</sub>	99.9%	0
CO	200	0
CO <sub>2</sub>	3000	0
H <sub>2</sub> S	2000	0
Methanol	50	0
Hexane	3000	0

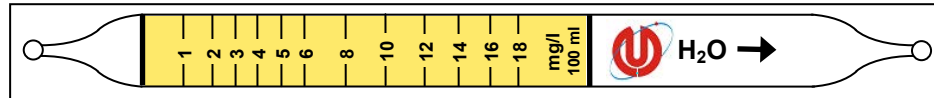
# Water Vapour H<sub>2</sub>O

TWA (TLV): NA

STEL (TLV): NA

## SWA-7M

Flammable Range: NA



Range Class	Extended	Standard	Extended
Measurement Range	Do not extend	1-18 mg/L	Do not extend
No. of Pump Strokes		1 (100 mL)	
Correction Factor (CF <sub>v</sub> )*		1.0	
Sampling Time	1 minute per pump stroke		
Color Change	Yellow → Blue		
Shelf Life	2 years		
Active Reagent	Magnesium perchlorate		

\* Multiply the observed reading by the correction factor (CF<sub>v</sub>) to obtain the true concentration.

### TEMPERATURE EFFECTS:

No correction necessary 0-40°C (32-104°F).

### CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response
CH <sub>4</sub>	99.9%	0
CO	200	0
CO <sub>2</sub>	3000	0
H <sub>2</sub> S	2000	0
Methanol	50	0
Hexane	3000	0

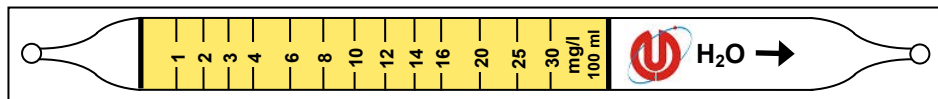
# Water Vapour H<sub>2</sub>O

# SWA-7

TWA (TLV): NA

STEL (TLV): NA

Flammable Range: NA



Range Class	Extended	Standard	Extended
Measurement Range	Do not extend	1-30 mg/L	Do not extend
No. of Pump Strokes		1 (100 mL)	
Correction Factor (CF <sub>v</sub> )*		1.0	
Sampling Time	1 minute per pump stroke		
Color Change	Yellow → Blue		
Shelf Life	2 years		
Active Reagent	Magnesium perchlorate		

\* Multiply the observed reading by the correction factor (CF<sub>v</sub>) to obtain the true concentration.

## TEMPERATURE EFFECTS:

No correction necessary 0-40°C (32-104°F).

## CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response
CH <sub>4</sub>	99.9%	0
CO	200	0
CO <sub>2</sub>	3000	0
H <sub>2</sub> S	2000	0
Methanol	50	0
Hexane	3000	0

# DOSIMETER TUBES

Uniphos Dosimeter Tubes are designed for measuring total dose or average concentrations over a period of time, such as a few hours or even a few days. No active sampling pump is required; sample enters the tube simply by diffusion.

## MEASUREMENT PROCEDURES:

1. Insert the shorter, arrow-marked end of the tube securely into the tube holder and break the tube at the etched mark.
2. Remove the broken end from the tube holder and insert the measurement end fully into the holder.
3. Attach the tube holder with the tube to the shirt collar for personal monitoring, or place it in an appropriate point in the space to be monitored for chemical exposure.
4. Note the measurement start time on one of the adhesive labels included in each box of tubes and attach the label to the tube.
5. At the end of exposure, read the stain length and multiply by the factor on the end of the scale (if any) to obtain the total dose.
6. If desired, calculate the average concentration or the 8-hr time-weighted average (TWA) dose during the exposure as follows:

$$\text{Avg. Conc. (ppm)} = \frac{\text{Dose (ppm}\cdot\text{hrs)}}{\text{Exposure Time (hrs)}}$$

$$\text{8-hr TWA (ppm)} = \frac{\text{Dose (ppm}\cdot\text{hrs)}}{8 \text{ hrs/day}}$$

For example, a reading of 80,000 ppm-hours equals a TWA of 10,000 ppm\*.

\*Although TWA is usually given in ppm, the actual units are ppm-days.

**CAUTION:** Avoid contact of the tube contents with skin or food products.

## TEMPERATURE AND HUMIDITY EFFECTS:

No correction necessary 10-90% RH.

Long-Term Dosimeter Type for TWA Measurements

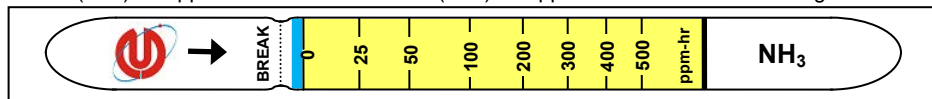
## Ammonia NH<sub>3</sub>

## LAM-2

TWA (TLV): 25 ppm

STEL (TLV): 35 ppm

Flammable Range: 15-28%



<b>Measurement Range</b>	3-1000 ppm (scale 25-500 ppm-hours)
<b>Sampling</b>	By diffusion for 0.5 to 8 hours
<b>Color Change</b>	Yellow → Blue
<b>Shelf Life</b>	2 years (preferred storage below 10°C (50°F))
<b>Active Reagent</b>	Acid/base pH change
<b>Calibration Conditions</b>	25-500 ppm NH <sub>3</sub> for 1 hr at 20°C and 50% RH

## CROSS-SENSITIVITIES:

Amines and hydrazine give a similar stain and increase the reading.

## TUBE READING:

Divide by 8 to obtain the 8-hr TWA. Thus, a reading of 160 ppm-hours equals to a TWA of 20 ppm

Long-Term Dosimeter Type for TWA Measurements

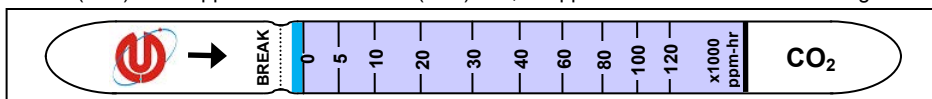
## Carbon Dioxide CO<sub>2</sub>

## LCD-2

TWA (TLV): 5000 ppm

STEL (TLV): 30,000 ppm

Flammable Range: NA



<b>Measurement Range</b>	625-240,000 ppm (scale 5000-120,000 ppm-hrs)
<b>Sampling</b>	By diffusion for 0.5 to 8 hours
<b>Color Change</b>	Blue → White
<b>Shelf Life</b>	2 years (preferred storage below 10°C (50°F))
<b>Active Reagent</b>	Sodium hydroxide
<b>Calibration Conditions</b>	1000 ppm CO <sub>2</sub> for 5-120 hrs at 30°C and 60% RH

## CROSS-SENSITIVITIES:

H<sub>2</sub>S and SO<sub>2</sub> in the TLV range do not interfere.

## TUBE READING:

Multiply the stain length reading by 1000 to obtain the total dose and divide by 8 to obtain the 8-hr TWA. For example, a reading of 80 equals 80,000 ppm-hours or a TWA of 10,000 ppm.

Long-Term Dosimeter Type

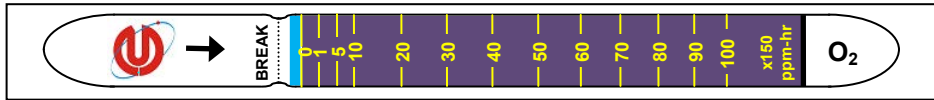
# Oxygen O<sub>2</sub>

# LOX-1

TWA (TLV): NA

STEL (TLV): NA

Flammable Range: NA



<b>Measurement Range</b>	150-15,000 ppm-hours
<b>Sampling</b>	By diffusion
<b>Color Change</b>	Violet → White
<b>Shelf Life</b>	2 years (preferred storage below 10°C (50°F))
<b>Active Reagent</b>	Titanium chloride
<b>Calibration Conditions</b>	150 ppm O <sub>2</sub> for 1-100 hrs at 20°C (68°F)

### TUBE READING:

Multiply the stain length reading by 150 to obtain the total dose. For example, a reading of 40 equals 6,000 ppm-hours.

**CAUTION:** HCl is generated by the reaction of oxygen with TiCl<sub>3</sub> on the tube. Avoid contact of the tube contents with skin or food products.

Long-Term Dosimeter Type

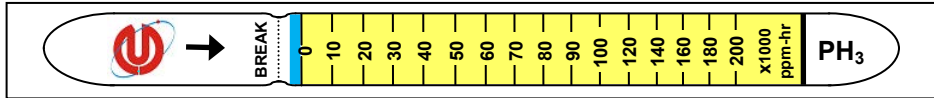
# Phosphine PH<sub>3</sub>

# LPG-1

TWA (TLV): 0.3 ppm

STEL (TLV): 1 ppm

Flammable Range: NA



<b>Measurement Range</b>	10,000-200,000 ppm-hours
<b>Sampling</b>	By diffusion
<b>Color Change</b>	Yellow → Black
<b>Shelf Life</b>	2 years (preferred storage below 10°C (50°F))
<b>Active Reagent</b>	Gold
<b>Calibration Conditions</b>	1000 ppm PH <sub>3</sub> for 10-200 hrs at 20°C (68°F)

### CROSS-SENSITIVITIES:

H<sub>2</sub>S, H<sub>2</sub>Se and AsH<sub>3</sub> if co-exist give a similar stain and increase the reading.

### TUBE READING:

Multiply the stain length reading by 1000 to obtain the total dose. For example, a reading of 20 equals 20,000 ppm-hours.

**CAUTION:** Avoid contact of the tube contents with skin or food products.

Long-Term Dosimeter Type

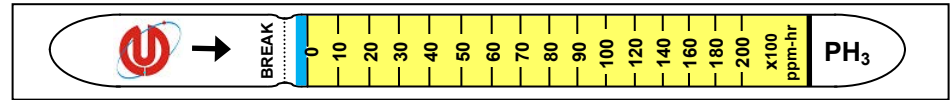
# Phosphine PH<sub>3</sub>

# LPG-2

TWA (TLV): 0.3 ppm

STEL (TLV): 1 ppm

Flammable Range: NA



<b>Measurement Range</b>	1,000-20,000 ppm-hours
<b>Sampling</b>	By diffusion
<b>Color Change</b>	Yellow → Black
<b>Shelf Life</b>	2 years (preferred storage below 10°C (50°F))
<b>Active Reagent</b>	Gold
<b>Calibration Conditions</b>	100 ppm PH <sub>3</sub> for 10-200 hrs at 20°C (68°F)

### CROSS-SENSITIVITIES:

H<sub>2</sub>S, H<sub>2</sub>Se and AsH<sub>3</sub> if co-exist give a similar stain and increase the reading.

### TUBE READING:

Multiply the stain length reading by 100 to obtain the total dose. For example, a reading of 40 equals 4,000 ppm-hours.

**CAUTION:** Avoid contact of the tube contents with skin or food products.

# DISSOLVED ION TUBES

Uniphos Dissolved Ion Tubes are used for measuring chloride and sulfide ions in water samples. No pump is needed as the water is drawn up into the tube by capillary action. The following ranges are available:

Ion	Tube No.	Range
Chloride	DCL-4L	5-200 ppm
Chloride	DCL-5M	10-2000 ppm
Sulfide	DSU-2M	0.5-20 ppm
Sulfide	DSU-3	1-100 ppm
Sulfide	DSU-4M	2-300 ppm

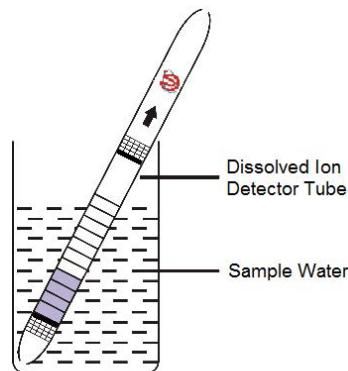


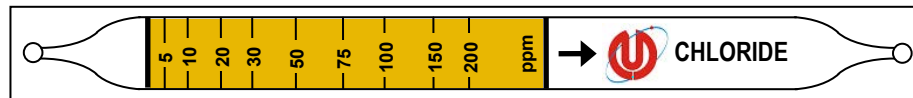
Figure 1

## MEASUREMENT PROCEDURES

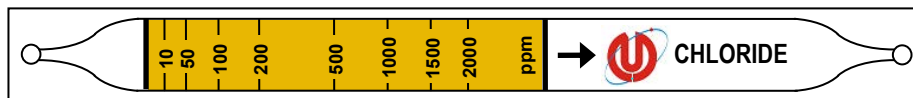
1. Place about 50-75 mL of sample water into a clean, dry 100-mL beaker.
2. Break open both ends of the tube using the metal strip tip breaker supplied with each box of tubes.
3. Immerse one end of the tube into the water sample so that the indicating arrow mark points upwards (Figure 1). Allow capillary action to draw water up through the sensing reagent column until it reaches the upper end plug, and then remove the tube from the beaker.
4. If the sample water contains the target ion, the reagent in the tube turns the indicated color. Read the concentration from the length of the stain.
5. If the stain length exceeds the highest calibration mark, dilute the sample with pure, ion-free water and re-test using a fresh tube. The true concentration is to be obtained by multiplying the tube reading by the dilution factor.
6. Check for possible cross-sensitivities.

## Chloride Ion (in Water) $\text{HCl}/\text{Cl}^-$

### DCL-4L



### DCL-5M



Tube	DCL-4L	DCL-5M
<b>Measurement Range</b>	5-200 ppm	10-2000 ppm
<b>Sampling Time</b>	3 minutes	3 minutes
<b>Color Change</b>	Brown → White	Brown → White
<b>Shelf Life</b>	2 years	2 years
<b>Active Reagent(s)</b>	Silver(I) chromate	Silver(I) chromate

## TEMPERATURE & pH EFFECTS:

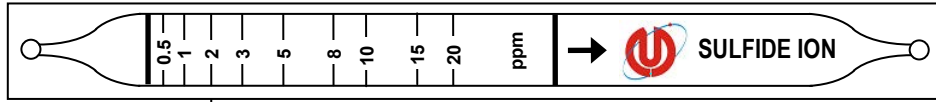
No correction necessary 0-40°C (32-104°F) & pH 4-12.

## CROSS-SENSITIVITIES:

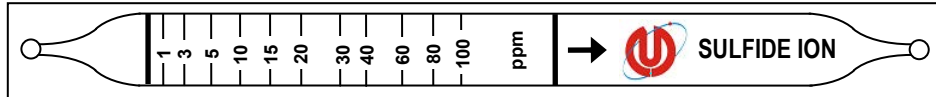
Compound	Conc. (ppm)	Apparent Response DCL-4L	Apparent Response DCL-5M
Carbonate ion	1000	0	0
Copper ion	1000	0	0
Iron ion	1000	0	0

# Sulphide Ion (in Water) $H_2S/HS^-/S^{2-}$

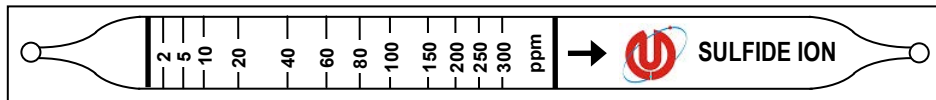
## DSU-2M



## DSU-3



## DSU-4M



Tube	DSU-2M	DSU-3	DSU-4M
<b>Measurement Range</b>	0.5-20 ppm	1-100 ppm	2-300 ppm
<b>Sampling Time</b>	3 minutes	3 minutes	3 minutes
<b>Color Change</b>	White → Brown	White → Brown	White → Brown
<b>Shelf Life</b>	2 years	2 years	2 years
<b>Active Reagent(s)</b>	Lead acetate	Lead acetate	Lead acetate

### TEMPERATURE & pH EFFECTS:

No correction necessary 0-40°C (32-104°F) & pH 4-12.

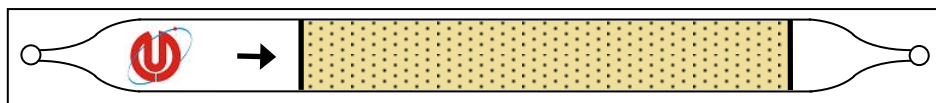
### CROSS-SENSITIVITIES:

Compound	Conc. (ppm)	Apparent Response DSU-2M	Apparent Response DSU-3	Apparent Response DCL-4M
Carbonate ion	100	0	0	0
Chloride ion	150	0	0	0
Copper ion	100	0	0	0
Iron ion	100	0	0	0

# SMOKE TUBES

Uniphos Smoke Tubes are designed for both visualizing air flows and for respirator fit testing. When exposed to ambient (humid) air, these tubes generate a visible smoke that can be used to observe flow patterns in fume hoods, detecting leaks in ventilation systems and the like. Also, Because the stannic chloride generated smoke is an irritant, it is recommended for use by OSHA in testing respirator masks for proper fit.

The Smoke Tube Kit consists of a soft carry case containing a rubber squeeze bulb, a tube tip breaker and a box of 12 smoke tubes.



## SPECIFICATIONS

<b>Smoke Generation</b>	White smoke is released on exposure to humidity. Tube contents become slightly whiter on use.
<b>Capacity</b>	Minimum 1.5 L of smoke generated at 30°C (7.5 min at 200 mL/min or 10 min at 150 mL/min)

## ACTIVE REAGENT

Stannic chloride

## OPERATING PROCEDURE

1. Open both ends of the tube using the tube tip breaker provided.
2. Insert one end of the tube securely into a rubber squeeze bulb or other pump outlet.
3. Squeeze the rubber bulb, or start any other pump used. Air pushed through the tube releases stannic chloride, which reacts with moisture in the air to generate a white smoke.
4. Tubes can be re-used until no more smoke is released. Between uses, close both ends of the tube with the rubber caps provided.

## TEMPERATURE AND HUMIDITY EFFECTS

At least 10% relative humidity is required in the ambient air to form a visible smoke. Dry gas can be used to drive the stannic chloride out of the tube, as long as it is released into ambient air with  $\geq 10\%$  relative humidity. Below 30°C

the operating time is longer than indicated above, and with increasing temperature the operating time decreases.

## CAUTION

- Read, understand, and comply with all labels, warnings and instructions accompanying these tubes before use. Failure to comply may result in severe injury or death.
- Wear a respirator as in NIOSH 42 CFR 84 when exposed to smoke from the tubes. Wear safety glasses and gloves to guard against flying glass pieces and chemical exposure.
- Avoid contact of the smoke with eyes or skin. Vapors are corrosive to the skin and high exposures can cause skin burns, severe injury or death. If smoke contacts eyes or skin, flush with water for 15 minutes and call a physician.
- Respirator fit testing should be conducted in strict compliance with OSHA 29 CFR 1910.134 (Appendix A) and 29 CFR 1910.139. Subject should keep eyes closed during fit testing. **Do not** use these tubes for fit testing on individuals who have pre-existing respiratory or cardiovascular medical conditions, or are allergic to tin compounds or hydrochloric acid.
- During fit testing, use only the pump(s) and flow rates specified in OSHA 29 CFR 1910.134 (Appendix A) and 29 CFR 1910.139. If non-specified flow rates are used, the smoke concentration could accumulate enough to cause severe injury or death.
- Use only in a well-ventilated area. **Do not** use in a confined space or under a respiratory fit testing hood, as fume concentrations can build up enough to cause severe injury or death.
- **Do not** inhale smoke directly. If inhalation causes coughing, move victim to fresh air. If coughing persists, provide oxygen and call a physician.
- **Do not** allow smoke to contact food or use smoke tubes in dining areas. Ingestion of food or drink that has been exposed to smoke may cause severe injury or death.
- When using smoke as a flow indicator, avoid exposure to persons that may be downstream of the smoke.
- The process of breaking open a tube can generate flying glass bits and leave the tube with sharp edges. Use eye and hand protection when opening tubes.
- Keep tubes out of reach of unauthorized persons, especially children.

## DISPOSAL:

Dispose of used tubes according to local regulations. Each tube contains about 0.8 g of stannic chloride before use. The tube contents produce HCl on contact with water.

# CHARCOAL TUBES

Uniphos Granular Activated Carbon (GAC) tubes are used to adsorb and measure concentrations of contaminants in air. They are particularly suited for volatile organic compounds (VOCs) like aromatics and chlorinated solvents, but can also be used for alkanes, ketones, esters, amines, etc., and some volatile inorganic compounds. The tube requires a separate pump to draw an air sample and a system for desorbing and analyzing the adsorbed compounds, typically by solvent extraction and gas chromatography (GC). During sampling, the VOCs are adsorbed onto the main GAC layer, and may spill over onto the shorter breakthrough layer. If any VOCs are detected in the breakthrough layer, it is an indication that the measurement layer has been overloaded and the readings may be low. From the flowrate, sampling time, and mass of adsorbate recovered, the average air concentration during sampling can be calculated.

## MEASUREMENT PROCEDURES:

1. Break open both ends of the tube just before sampling.
2. Connect the tube to a pump, ensuring that the air flow is in the direction of the arrow mark on the tube.
3. Pump sample gas through the tube at a flowrate of up to the maximum listed in the table below.
4. Continue sampling for a specified period of time and then cap the tube using the plastic caps provided.
5. To avoid loss of adsorbed compounds, do not remove the caps until just before desorption for analysis by GC or other methods.

**CAUTION:** High temperatures, high humidity, and excessive flowrates can cause reduced adsorption capacity.

## Standard Size



## Large Size



## Jumbo Size



Adsorbable Compounds	Most organics (VOCs) and some inorganics		
Adsorption Material	Coconut shell granular activated carbon (GAC)		
	Standard	Large	Jumbo
<b>Toluene Adsorption Capacity at Room Temp.</b>	20 mg	80 mg	160 mg
<b>Adsorption Layer</b>	100 mg	400 mg	800 mg
<b>Breakthrough Layer</b>	50 mg	200 mg	200 mg
<b>Recommended Flowrate</b>	0.01-0.2 L/min	0.01-1.0 L/min	0.01-1.5 L/min
<b>Tube Length</b>	70 ± 1.0 mm	110 ± 2.0 mm	110±2.0 mm
<b>Tube Outer Diameter</b>	6.0 ± 0.5 mm	8.0 ± 0.5 mm	10.0±0.5 mm

# APPENDIXES

## APPENDIX I. PRESSURE EFFECTS ON TUBE MEASUREMENTS

Detector tube measurements are affected by pressure if the tubes are calibrated in relative concentrations such as ppm by volume (ppmv). Uniphos tubes with scales marked as “ppm” fall into this category. Tubes that are calibrated in absolute units such as mg/L, mg/m<sup>3</sup>, or lbs/MMCF do not require any correction. For tubes calibrated in ppm, pressure corrections due to weather changes are usually small enough to cause only a few percent error and can be ignored. However, at high altitudes over a few thousand feet, pressure effects can become noticeable and corrections are desirable. The correction is simply the ratio of normal atmospheric pressure to the actual pressure:

$$\text{True Conc.} = \text{Reading} \times [760 \text{ mm Hg} / \text{Pressure (mm Hg)}]$$

$$\text{True Conc.} = \text{Reading} \times \text{CF}_p$$

This correction amounts to a pressure correction factor  $\text{CF}_p$  of 1.00 at sea level (760 mm Hg), 1.12 at 3000 feet (676 mmHg), 1.27 at 6000 feet (601 mm Hg), and 1.42 at 9000 feet (534 mm Hg).

## APPENDIX II. HUMIDITY CONVERSION TABLE

Temp. or Dew Point		Pv *	Pv	Pv	Pv Grains	%RH
°F	°C					
-70	-56.7	2.6	0.0026	0.2	0.08	0.01%
-60	-51.1	11	0.011	0.7	0.14	0.04%
-50	-45.6	39	0.038	2.3	0.3	0.16%
-40	-40.0	127	0.12	7.5	0.6	0.51%
-30	-34.4	237	0.22	14	1.0	1.0%
-20	-28.9	417	0.37	23	1.8	1.7%
-10	-23.3	742	0.65	41	3.2	3.0%
0	-17.8	1258	1.1	67	5.5	5.1%
10	-12.2	2368	2.0	124	9.2	10%
20	-6.7	3658	3.0	188	15.1	15%
30	-1.1	5566	4.5	280	24.2	23%
40	4.4	8255	6.5	407	36.5	33%
50	10.0	12117	9.4	586	53.6	49%
60	15.6	17487	13.3	829	77.6	71%
70	21.1	24691	18.4	1149	111	100%
80	26.7	34566	25.3	1579	156	140%
90	32.2	47458	34.1	2128	218	192%
100	37.8	64680	45.6	2849	302	262%

\* Pv = Vapor Pressure

### APPENDIX III. CONVERSION FACTORS BETWEEN GAS CONCENTRATION UNITS

To Convert From	To	Multiply By
lbs/MMCF (H <sub>2</sub> O)	mg/m <sup>3</sup>	16.04
	mg/L	0.01604
	ppbv	21820 (@25°C)
	ppmv	21.82 (@25°C)
	Volume %	0.0218 (@25°C)
mg/L	lbs/MMCF (H <sub>2</sub> O)	62.33
	mg/m <sup>3</sup>	1000
	ppbv	10 <sup>6</sup> MV/(m <sub>w</sub> · P)
	ppmv	10 <sup>3</sup> MV/(m <sub>w</sub> · P)
	Volume %	0.1 MV/(m <sub>w</sub> · P)
mg/m <sup>3</sup>	lbs/MMCF (H <sub>2</sub> O)	0.06233
	mg/L	0.001
	ppbv	10 <sup>3</sup> MV/(m <sub>w</sub> · P)
	ppmv	MV/(m <sub>w</sub> · P)
	Volume %	10 <sup>-4</sup> MV/(m <sub>w</sub> · P)
ppmv	lbs/MMCF (H <sub>2</sub> O)	0.04583 (@25°C)
	mg/L	10 <sup>-3</sup> (m <sub>w</sub> · P)/MV
	mg/m <sup>3</sup>	(m <sub>w</sub> · P)/MV
	ppbv	1000
	Volume %	10 <sup>-4</sup>
ppbv	lbs/MMCF (H <sub>2</sub> O)	4.58 x 10 <sup>-5</sup> (@25°C)
	mg/L	10 <sup>-6</sup> (m <sub>w</sub> · P)/MV
	mg/m <sup>3</sup>	10 <sup>-3</sup> (m <sub>w</sub> · P)/MV
	ppmv	0.001
	Volume %	10 <sup>-7</sup>
Volume %	lbs/MMCF (H <sub>2</sub> O)	458.3 (@25°C)
	mg/L	10 (m <sub>w</sub> · P)/MV
	mg/m <sup>3</sup>	10 <sup>4</sup> (m <sub>w</sub> · P)/MV
	ppbv	10 <sup>7</sup>
	ppmv	10 <sup>4</sup>

Molar Volume (MV) of Air at 1 atmosphere pressure

Temp. (°F)	Temp. (°C)	MV (L/mol)
0	-17.8	20.96
10	-12.2	21.41
14	-10.0	21.59
20	-6.7	21.87
30	-1.1	22.32
32	0.0	22.41
40	4.4	22.78
50	10.0	23.23
60	15.6	23.69
68	20.0	24.06
70	21.1	24.15
80	26.7	24.60
86	30.0	24.88
90	32.2	25.06
100	37.8	25.51
104	40	25.70

m<sub>w</sub>: Molecular weight of chemical (g/mol)

P: Pressure (atmospheres)

MV: Molar Volume @ 1 atm (L/mol). For values see table to the right..

## APPENDIX IV. ALPHABETICAL TUBE LIST

Part No.	Tube Description	Part No.	Tube Description	Part No.	Tube Description
SAT4M	Acetaldehyde 10-300 ppm	SCS3	Carbon Disulfide 5-100 ppm	SEO3	Ethylene Oxide 1-100 ppm
SAA2	Acetic Acid 2.5-50 ppm	SCS5M	Carbon Disulfide 50-1600 ppm	SEO7	Ethylene Oxide 0.05-3%
SAC5	Acetone 50-4000 ppm	SCO3	Carbon Monoxide 5-100 ppm	SFO3	Formaldehyde 5-100 ppm
SAL5	Acetylene 100-5000 ppm		Carbon Monoxide in H <sub>2</sub> 5-100 ppm	SFA2M	Formic Acid 1-15 ppm
SAG2	Acid Gases 2-40 ppm	SCH3		SFU6	Furan 0.01-1%
SAN4L	Acrylonitrile, 5-120 ppm	SCO4M	Carbon Monoxide 25-600 ppm	SFL2M	Furfural 1-16 ppm
SMA3	Amines 5-100 ppm	SCO4	Carbon Monoxide 50-1000 ppm	SGA6L	Gasoline 0.03-0.6%
SAM2	Ammonia 2.5-50 ppm	SCO5	Carbon Monoxide 100-3000 ppm		General HCs (n-Hex) 10-1200 ppm
SAM3	Ammonia 5-100 ppm	SCO6M	Carbon Monoxide 0.01-0.7%	SHE5L	
SAM4M	Ammonia 10-300 ppm	SCO7	Carbon Monoxide 0.1-5%	SHE6L	General HCs (n-Hex) 0.25-0.6%
SAM4	Ammonia 50-1000 ppm	SCO8	Carbon Monoxide 1-20%		
SAM5	Ammonia 250-5000 ppm	SCT3L	Carbon Tetrachloride 1-60 ppm	SHS3LSSD1	H <sub>2</sub> S+SO <sub>2</sub> 2.5-60 + 0.5-10 ppm
SAM8M	Ammonia 0.5-10%	SCU3	Carbonyl Sulfide 5-100 ppm	SHY1L	Hydrazine 0.1-2 ppm
SAM9	Ammonia 1-30%	SCL1M	Chlorine 0.25-5 ppm	SHC1	Hydrogen Chloride 1-10 ppm
SAI2	Aniline 2-30 ppm	SCL2	Chlorine 2.5-50 ppm	SHC2M	Hydrogen Chloride 2-20 ppm
SAR2	Arsine 1-30 ppm	SCL3	Chlorine 5-100 ppm	SHC3	Hydrogen Chloride 5-100 ppm
SAO4	Aviation Oil 0.1-5 mg/L	SCL4M	Chlorine 50-500 ppm	SHC4	Hydrogen Chloride 50-1000 ppm
SBE2L	Benzene 0.25-12 mg/L	SCI1M	Chlorine Dioxide 0.1-5 ppm	SHN2	Hydrogen Cyanide 2.5-50 ppm
SBE2	Benzene 2.5-50 ppm	SCB4L	Chlorobenzene 10-200 ppm	SHN3	Hydrogen Cyanide 5-100 ppm
SBE3	Benzene 5-100 ppm	SCY5L	Cyclohexane 10-1200 ppm	SHN4	Hydrogen Cyanide 50-1000 ppm
SBR2M	Bromine 1-20 ppm	SCY6L	Cyclohexane 0.025-0.6%	SHF2	Hydrogen Fluoride 0.5-30 ppm
SBR3	Bromine 5-100 ppm	SCN3	Cyclohexanone 2-100 ppm	SHS1H	Hydrogen Sulfide 0.5-7 ppm
SBU2M	Butadiene 1-20 ppm	SCA2	Cyclohexylamine 0.5-30 ppm		Hydrogen Sulfide 0.5-7 ppm calibrated in Natural Gas
SBU3	Butadiene 5-100 ppm	SDL4	Diesel Fuel 0.1-5 mg/L	SHS1HNG	
SBT5M	Butane 50-1400 ppm	SDE6	Diethyl Ether 0.04-1%	SHS1	Hydrogen Sulfide 0.5-10 ppm
SNB4L	1-Butanol 10-150 ppm	SDA2M	Diethylamine 1-20 ppm	SHS2	Hydrogen Sulfide 1-30 ppm
SIB4L	2-Butanol 10-150 ppm	SMF2	Dimethylformamide 2-30 ppm	SHS3L	Hydrogen Sulfide 2.5-60 ppm
SBA6	Butyl Acetate 0.005-1%	SET7	Ethanol 0.05-5%	SHS3	Hydrogen Sulfide 5-100 ppm
SBC3L	Butyl Acrylate 5-30 ppm	SEA7	Ethyl Acetate 0.1-5%	SHS4L	Hydrogen Sulfide 10-250 ppm
SBM1M	t-Butyl Mercaptan 0.5-30 mg/m <sup>3</sup>	SEF4M	Ethyl Formate 20-500 ppm	SHS4	Hydrogen Sulfide 50-800 ppm
SBM4L	t-Butyl Mercaptan 5-120 ppm	SEM2M	Ethyl Mercaptan 1-20 ppm	SHS5M	Hydrogen Sulfide 100-2000 ppm
SCD5	Carbon Dioxide 300-5000 ppm	SEM4L	Ethyl Mercaptan 5-120 ppm	SHS7M	Hydrogen Sulfide 0.1-2%
SCD7	Carbon Dioxide 0.25-3%	SEM4M	Ethyl Mercaptan 25-500 ppm	SHS7	Hydrogen Sulfide 0.5-4%
SCD8M	Carbon Dioxide 0.5-10%	SEB4L	Ethylbenzene 5-150 ppm	SHS8L	Hydrogen Sulfide 0.2-7%
SCD8	Carbon Dioxide 1-20%	SEB4M	Ethylbenzene 30-400 ppm	SHS8M	Hydrogen Sulfide 0.5-10%
SCD10	Carbon Dioxide 5-60%	SED2	Ethylene Dibromide 1-50 ppm	SHS9	Hydrogen Sulfide 2-40%
SCS2	Carbon Disulfide 2.5-50 ppm	SEG2	Ethylene Glycol 10-100 mg/m <sup>3</sup>	SIP7M	Isopropyl Alcohol 0.1-2.5%
				SIA2	Isopropylamine 2.5-50 ppm

Part No.	Tube Description
SHG1L	Mercury Vapor 0.1-2 mg/m3
SME5	Methanol 100-5000 ppm
SME8L	Methanol 0.05-6%
SMB2M	Methyl Bromide 1-18 ppm
SMB3	Methyl Bromide 10-100 ppm
SMB4M	Methyl Bromide 20-300 ppm
SMB4	Methyl Bromide 50-1000 ppm
SMK6L	Methyl Ethyl Ketone 0.02-0.6% Methyl Isobutyl Ketone 0.02-0.6%
SMI6L	
SMM2M	Methyl Mercaptan 1-20 ppm
SMM4L	Methyl Mercaptan 5-120 ppm
SMC4M	Methylene Chloride 50-500 ppm
SMG1	Multigas Qualitative
SNA2M	Nitric Acid 1-20 ppm
SND2	Nitrogen Dioxide 0.5-30 ppm
SND4	Nitrogen Dioxide 10-1000 ppm
SNO2M	Nitrogen Oxides 0.5-15 ppm
SNO5M	Nitrogen Oxides 100-2500 ppm
SOC5	Octane 3-23 mg/L
SOX9M	Oxygen 3-24%
SOZ3	Ozone 5-100 ppm
SOZ4M	Ozone 25-500 ppm
SPE2M	Phenol 1-25 ppm
SPG1	Phosgene 0.1-10 ppm
SPH1L	Phosphine 0.05-2.5 ppm
SPH1	Phosphine 0.1-10 ppm
SPH1M	Phosphine 0.3-5 ppm
SPH3	Phosphine 5-100 ppm
SPH4	Phosphine 50-1000 ppm
SPH5	Phosphine 150-3000 ppm Stoddard Solvent 50-8000 mg/m3
SSS5M	
SSD1	Sulfur Dioxide 0.5-10 ppm
SSD2M	Sulfur Dioxide 1-25 ppm
SSD3	Sulfur Dioxide 5-100 ppm
SSD4M	Sulfur Dioxide 20-300 ppm
SSD6M	Sulfur Dioxide 500-8000 ppm
SSD5	Sulfur Dioxide 0.02-0.3%
SSD7M	Sulfur Dioxide 0.1-3%

Part No.	Tube Description
SSD7	Sulfur Dioxide 0.25-5%
SSA1L	Sulfuric Acid 0.5-5mg/m3
STE3	Tetrachloroethylene 5-100 ppm
STH4	Tetrahydrofuran 50-800 ppm
STO2	Toluene 2-50 ppm
STO4M	Toluene 10-300 ppm
SCE2M	Trichloroethylene 1-16 ppm
SCE4L	Trichloroethylene 20-250 ppm
SCE6	Trichloroethylene 0.05-1%
SVC2M	Vinyl Chloride 1-20 ppm
SVC6	Vinyl Chloride 0.05-1%
SWA4L	Water Vapor 2-10 lbs/MMCF
SWA4	Water Vapor 6-40 lbs/MMCF
SWA5	Water Vapor 0.1-2 mg/L
SWA7M	Water Vapor 1-18 mg/L
SWA7	Water Vapor 1-30 mg/L
SXY4	Xylenes 25-1000 ppm

#### DOSIMETER TUBES

Part No.	Tube Description
LAM2	Ammonia 25-500 ppm-hr Carbon Dioxide 5000-120,000 ppm-hr
LCD2	
LOX1	Oxygen 150-15,000 ppm-hr
LPG1	Phosphine 1000-200,000 ppm-hr
LPG2	Phosphine 100-20,000 ppm-hr

#### DISSOLVED ION TUBES

Part No.	Tube Description
DSU2M	Sulfide Ion, 0.5-20 ppm
DSU3	Sulfide Ion, 1-100 ppm
DSU4M	Sulfide Ion, 2-300 ppm
DCL4L	Chloride Ion, 5-200 ppm
DCL5M	Chloride Ion, 10-2000 ppm

#### SMOKE TUBES

Part No.	Tube Description
UNI-CF000154	Smoke (Air Flow Indicator)

CHARCOAL (GAC) TUBES	
Part No.	Tube Description
UNI-CF000162	Standard Size, 6x70 mm
UNI-CF000163	Large Size, 8x110 mm
UNI-CF000164	Jumbo Size, 10x110 mm

## APPENDIX V. UNIPHOS TUBE EQUIVALENTS OF OTHER MANUFACTURERS

Compound	Uniphos Tube	Uniphos Range (ppm)	Gastec Tube	Gastec Range (ppm)	RAE Tube	RAE Range (ppm)	Kitagawa Tube	Kitagawa Range (ppm)
Acetaldehyde	SAT-4M	10-300	92M	5-100			133SB	5-140
Acetic Acid	SAA-2	2.5-50	81	2-50			216S	1-50
Acetone	SAC-5	50-4000	151L	50-4000			102SD	50-2000
Acetylene	SAL-5	0.01-0.5%	171	0.1-2%			101S	0.005-0.1%
Acid Gases	SAG-2	2-40	80	2-40				
Acrylonitrile	SAN-4L (DB)	5-120	191 (DB)	5-120			128SC (DB)	1-120
Amines	SMA-3	5-100	180	5-100	10-132-10	0.5-10		
Ammonia	SAM-2	2.5-50	3L	2-30	10-100-05	1-30	105SD	1-20
Ammonia	SAM-3	5-100	3La	5-100	10-100-10	5-100	105SE	5-100
Ammonia	SAM-4M	10-300	3M	50-500	10-100-12	10-250		
Ammonia	SAM-4	50-1000	3M	50-500	10-100-15	25-500		
Ammonia	SAM-8M	0.5-10%	3H	1-16%	10-100-40	1-15%	105SA	0.5-10%
Ammonia	SAM-9	1-30%					105SH	0.5-30%
Aniline	SAI-2	2-30	181	2.5-30			181S	2-30
Arsine	SAR-2	1-30					140SA	5-160
Benzene	SBE-2L (DB I <sub>2</sub> O <sub>5</sub> )	0.25-12	121L (DB I <sub>2</sub> O <sub>5</sub> )	0.25-12			118SD	0.2-15
Benzene	SBE-2	2.5-50	121	5-60	10-101-10	5-40	118SC	2-50
Benzene	SBE-3	5-100	121S (DB)	5-120	10-101-20	5-100	118SE (DB)	1-80
Butadiene, 1,3-	SBU-2M (DB)	1-20	174LL	0.5-5			168SD (DB)	0.5-10
Butadiene, 1,3-	SBU-3 (DB)	5-100	174L	5-100			168SC	5-100
Butane	SBT-5M	50-1400	104	25-1400	10-137-30	25-1400	221SA	500-6000
Butanol, 1-	SNB-4L	10-150	114	10-150			190U	5-100
Butanol, 2-	SIB-4L	10-150	115	10-150			189U	10-300
Butyl Acetate	SBA-6	0.005-1%	142	0.05-0.8%			139SB	0.01-1%
Butyl Acrylate	SBC-3L	5-30					211U	2-60
Butyl Mercaptan, t-	SBM-1M	0.5-30 mg/m <sup>3</sup>	75	2.5-30 mg/m <sup>3</sup>			130U	2-18 mg/m <sup>3</sup>
Butyl Mercaptan, t-	SBM-4L	5-100			10-129-20	10-240		

\* DB = Double Tube System

Compound	Uniphos Tube	Uniphos Range (ppm)	Gastec Tube	Gastec Range (ppm)	RAE Tube	RAE Range (ppm)	Kitagawa Tube	Kitagawa Range (ppm)
Carbon Dioxide	SCD-5	300-5000	2LL	300-5000	10-104-30	300-5000	126B	300-7000
Carbon Dioxide	SCD-7	0.25-3%	2L	0.25-3%	10-104-45	0.25-3%	126SB	0.05-1%
Carbon Dioxide	SCD-8M	0.5-10%	2H	1-10%				
Carbon Dioxide	SCD-8	1-20%			10-104-50	1-20%	126SH	1-20%
Carbon Dioxide	SCD-10	5-60%	2HH	5-40%	10-104-60	5-40%	126UH	5-50%
Carbon Disulfide	SCS-2 (DB)	2.5-50	13 (DB)	2.5-50			141SB (DB)	2-50
Carbon Disulfide	SCS-3 (DB)	5-100						
Carbon Disulfide	SCS-5M (DB)	50-1600	13M (DB)	50-1600			141SA (DB)	30-500
Carbon Monoxide	SCO-3	5-100					106S	10-250
Carbon Monoxide in H2	SCH-3	5-100	1LK	5-100	10-102-20	5-100		
Carbon Monoxide	SCO-4M	25-600	1La	25-500	10-102-30	20-500	106SS	30-500
Carbon Monoxide	SCO-4	50-1000	1L or 1LM	50-1000			106SA	20-1000
Carbon Monoxide	SCO-5	100-3000						
Carbon Monoxide	SCO-6M	0.01-0.7%	1M	0.1-2%				
Carbon Monoxide	SCO-7	0.1-5%	1H	0.2-5%	10-102-45	0.2-4%	106SH	0.1-2%
Carbon Monoxide	SCO-8	1-20%	1HH	2-50%			106UH	0.1-10%
Carbon Tetrachloride	SCT-3L (DB)	1-60	134 (DB)	2.5-60			147S (DB)	1-60
Carbonyl Sulfide	SCU-3 (DB)	5-100	21 (DB)	10-100			239S	5-60
Chlorine	SCL-1M	0.25-5	8LA	0.5-8	10-106-10	0.5-8	109SB	0.5-10
Chlorine	SCL-2	2.5-50					109SA	1-40
Chlorine	SCL-3	5-100			10-106-20	5-100		
Chlorine	SCL-4M	50-500	8H	50-500				
Chlorine Dioxide	SCI-1M	0.1-5	23M	0.5-5	10-130-10	0.25-15	116	1-20
Chlorobenzene	SCB-4L	10-200	126	10-200			178SB (DB)	5-140
Cyclohexane	SCY-6L	0.025-0.6%					115S	0.01-0.6%
Cyclohexanone	SCE-3	2-100	154	2-30			197U	2-100
Diesel Fuel	SDL-4	0.1-5 mg/L (100-5000 mg/m <sup>3</sup> )			10-143-10	0.5-25 (4-180 mg/m <sup>3</sup> )		
Diethylamine	SDA-2M	1-20	180L	1-10	10-132-10	0.5-10	105SD	1-20
Dimethylformamide, N,N-	SMF-2 (DB)	2-30	183	2-30			196S	2-30
Dimethylhydrazine, 1,1- (UDMH)	SHY-1L	0.1-2	185	0.1-2			219S	0.1-5

\* DB = Double Tube System

Compound	Uniphos Tube	Uniphos Range (ppm)	Gastec Tube	Gastec Range (ppm)	RAE Tube	RAE Range (ppm)	Kitagawa Tube	Kitagawa Range (ppm)
Ethanol (Ethyl Alcohol)	SET-7	0.05-5%	112	0.05-2.5%	10-141-30	100-2000	104SA	0.05-5%
Ethyl Acetate	SEA-7	0.1-5%	141	0.1-1.5%			111SA	0.1-5%
Ethyl Ether (Diethyl Ether)	SDE-6	0.04-1%	161	0.04-1%			107SA	0.04-1.4%
Ethyl Mercaptan	SEM-4L	5-120	72	5-120	10-129-20	5-120	165SB	5-80
Ethylbenzene	SEB-4L	5-150	122	10-300	10-114-20	10-300	179S	10-500
Ethylbenzene	SEB-4M	30-400	122	10-300	10-114-20	10-300	179S	10-500
Ethylene Oxide	SEO-7	0.05-3%	163	0.05-3%			122SA	0.01-1.8%
Formaldehyde	SFO-3	5-100	92	2-20 (DB)			171SB (DB)	1-35
Formic Acid	SFA-2M	1-15					216S	1-50
Furan	SFU-6	0.01-1%					122SA	0.01-0.9%
Furfural	SFL-2M	1-16					190U	2-60
Gasoline	SGA-6L	0.03-0.6%	101	0.03-0.6%	10-138-30	0.003-0.1%	110SU	0.05-0.6%
Hexane, n-	SHE-5L	10-1200	102L	50-1200	10-110-30	70-1400	113SB	50-1400
Hexane, n-	SHE-6L	0.025-0.6%	102H	0.03-0.6%			113SA	0.05-0.6%
Hydrazine	SHY-1L	0.1-2	185	0.1-2			219S	0.1-5
Hydrocarbons	SHE-5L	10-1200	105	200-3000	10-110-30	50-1000	187S	50-1400
Hydrocarbons	SHE-6L	0.025-0.6%	103	0.1-1.2%				
Hydrogen	SHD-6M	0.05-0.8%	30	0.5-2%			137U	0.05-0.8%
		Length of stain		Color compar.				Length of stain
Hydrogen Chloride	SHC-1	1-10			10-108-09	1-20		
Hydrogen Chloride	SHC-2M (DB)	2-20	14L	1-20	10-108-10 (DB)	1-20	173SB (DB)	2-20
Hydrogen Chloride	SHC-3 (DB)	5-100	14M	20-500	10-108-22	20-500	173SA	20-600
Hydrogen Chloride	SHC-4	50-1000	14M	20-500	10-108-22	20-500	173SA	20-600
Hydrogen Cyanide	SHN-2	2.5-50	12L	2.5-60	10-126-10	2.5-60	112SB	2-100
Hydrogen Cyanide	SHN-3	5-100	12L	2.5-60	10-126-10	2.5-60	112SB	2-100
Hydrogen Cyanide	SHN-4	50-1000	12M	50-800				
Hydrogen Fluoride	SHF-2	0.5-30	17	0.5-20	10-105-10	0.5-20	156S	0.5-30

\* DB = Double Tube System

Compound	Uniphos Tube	Uniphos Range (ppm)	Gastec Tube	Gastec Range (ppm)	RAE Tube	RAE Range (ppm)	Kitagawa Tube	Kitagawa Range (ppm)
Hydrogen Sulfide	SHS-1H	0.5-7	4LB	1-6	10-103-06	1-7	120SE	1-20
Hydrogen Sulfide	SHS-1	0.5-10	4LB	1-6	10-103-06	1-7	120SE	1-20
Hydrogen Sulfide	SHS-2	1-30	4LK	2-20			120SD	1-30
Hydrogen Sulfide	SHS-3L	2.5-60	4LL	2.5-60	10-103-10	2.5-60		
Hydrogen Sulfide	SHS-3	5-100	4L	10-120	10-103-15	10-120	120SB	3-150
Hydrogen Sulfide	SHS-4L	10-250	4M	25-250	10-103-18	25-250	120SB	3-150
Hydrogen Sulfide	SHS-4	50-800	4HM	50-800	10-103-20	50-800	120SF	50-1000
Hydrogen Sulfide	SHS-5M	100-2000	4H	100-2000	10-103-30	100-2000	120SC	50-1600
Hydrogen Sulfide	SHS-7M	0.1-2%	4HH	0.1-2%	10-103-40	0.1-2%	120SM	0.05-0.6%
Hydrogen Sulfide	SHS-7	0.5-4%					120SH	0.1-4%
Hydrogen Sulfide	SHS-8L	0.2-7%						
Hydrogen Sulfide	SHS-8M	0.5-10%	4HP	0.5-10%			120UH	2-20%
Hydrogen Sulfide	SHS-9	2-40%	4HT	2-20%	10-103-50	2-40%	120UT	5-40%
H <sub>2</sub> S + SO <sub>2</sub> (DB)	SHS-3L & SSD-1	2.5-60 & 0.5-10	45S	2.5-60 & 0.5-10				
Isopropyl Alcohol (Isopropanol)	SIP-7M	0.1-2.5%	113	0.04-2.5%	10-141-30	0.013-0.26%	122SA	0.05-2.5%
Isopropyl Ether	SDE-6	130-3400					111U	30-800
Maleic Anhydride	SAA-2	1-20	81	0.8-20			216S	0.2-10
Mercaptans	SMM-2M	1-20	71	2.5-70			130U	0.5-5
Mercaptans	SMM-4L	5-120	70	5-120	10-129-20	5-120	164SA	5-140
Mercury Vapor	SHG-1L	0.1-2 mg/m <sup>3</sup>	40	0.25-6 mg/m <sup>3</sup>			142S	0.1-2 mg/m <sup>3</sup>
Methanol (Methyl Alcohol)	SME-5	100-5000	111L	40-1000	10-141-30	100-2000	119U	20-1000
Methylamine	SMA-3	5-100	180L	0.5-10	10-132-10	0.5-10	227S	1-20
Methyl Bromide	SMB-2M	1-18	136LA (DB)	1-18	10-131-10	1-18	157SB	2-80
Methyl Bromide	SMB-3	10-100	136L (DB)	10-100				
Methyl Bromide	SMB-4M	20-300	136H (DB)	20-300			157SA	10-500
Methylene Chloride	SMC-4M (DB)	50-500	138 (DB)	50-500			180S (DB)	30-1000
Methyl Ethyl Ketone (MEK)	SMK-6L	0.02-0.6%	152	0.02-0.6%	10-113-20	0.02-0.6%	139SB	0.01-1.4%
Methyl Mercaptan	SMM-2M	1-20	71	2.5-70			130U	0.5-5
Methyl Mercaptan	SMM-4	5-120	70	5-120	10-129-20	5-120	164SA	5-140
Methyl Isobutyl Ketone (MIBK)	SMI-6L	0.02-0.6%	153	0.05-0.6%	10-113-20	0.04-1.2%	122SA	0.01-0.6%

\* DB = Double Tube System

Compound	Uniphos Tube	Uniphos Range (ppm)	Gastec Tube	Gastec Range (ppm)	RAE Tube	RAE Range (ppm)	Kitagawa Tube	Kitagawa Range (ppm)
Multi-gas Inorganic	SMG-1	qualitative	Polytec II (25)	qualitative			131	qualitative
Nitric Acid	SNA-2M	1-20	15L	1-20			233S	2-20
Nitrogen Dioxide	SND-2	0.5-30	9L	0.5-30	10-117-10	0.5-30	117SB	0.5-30
Nitrogen Dioxide	SND-4	10-1000					117SA	20-1000
Nitrogen Oxides	SNO-2M	0.5-15	11L	0.2-5	10-109-20	1-50	175U	0.5-15
Nitrogen Oxides	SNO-5M	100-2500	11HA	50-2500			175SH	100-2500
Oxygen	SOX-9M	3-24%	31B	6-24%			159SA/SB	2-24%
Ozone	SOZ-3	5-100	18M	20-200			182SB	5-50
Ozone	SOZ-4M	25-500	18M	20-200			182SA	50-500
Phenol	SPE-2M	1-25	60	1-25	10-139-05	1-25	183U	0.5-25
Phosgene	SPG-1	0.1-10	16	0.1-5			146S	0.5-20
Phosphine	SPH-1L	0.05-2.5	7LA	0.1-1.5				
Phosphine	SPH-1M	0.3-5	7L	0.3-5				
Phosphine	SPH-1	0.1-10					121SD	0.5-10
Phosphine	SPH-3	5-100	7	5-50	10-116-10	5-50	121SB	5-90
Phosphine	SPH-4	50-1000	7J	25-500	10-116-30	50-1000	121SC	20-700
Phosphine	SPH-5	150-3000					121SH	100-1600
Stoddard Solvent	SSS-5M	50-8000 mg/m <sup>3</sup>	128	50-8000 mg/m <sup>3</sup>				
Sulfur Dioxide	SSD-1	0.5-10	5LC	0.25-10			103SE	0.5-10
Sulfur Dioxide	SSD-2M	1-25	5La	2-30	10-107-15	2-30	103SD	1-60
Sulfur Dioxide	SSD-3	5-100	5L	5-100	10-107-20	5-100	103SD	1-60
Sulfur Dioxide	SSD-4M	20-300	5M	100-1800	10-107-25	100-1800	103SC	20-300
Sulfur Dioxide	SSD-5	0.02-0.3%			10-107-30	0.02-0.4%	103SB	0.02-0.3%
Sulfur Dioxide	SSD-6M	500-8000			10-107-30	200-4000		
Sulfur Dioxide	SSD-7M	0.1-3%					103SA	0.1-3%
Sulfur Dioxide	SSD-7	0.25-5%	5H	0.5-4%	10-107-40	0.2-5%		
Sulfuric Acid	SSA-1L	0.5-5 mg/m <sup>3</sup>	35	0.5-5 mg/m <sup>3</sup>			244U	0.5-5 mg/m <sup>3</sup>
Tetrachloroethylene (PCE)	STE-3	5-100	133M	5-100	10-119-20	3-57	135SA	5-150
Tetrahydrofuran	STH-4	50-800	159	50-800			162U	20-400
Toluene	STO-2	2-50	122L	2-50			124SB	2-100
Toluene	STO-4M	10-300	122	20-300	10-114-20	10-300	124SA	10-500

\* DB = Double Tube System

Compound	Uniphos Tube	Uniphos Range (ppm)	Gastec Tube	Gastec Range (ppm)	RAE Tube	RAE Range (ppm)	Kitagawa Tube	Kitagawa Range (ppm)
Trichloroethylene	SCE-2M (DB)	1-16	132L	2-25	10-119-20 (DB)	5-100	134SB	1-16
Trichloroethylene	SCE-4L (DB)	20-250	132HA	50-500			134SA	5-150
Trichloroethylene	SCE-6 (DB)	0.05-1%	132HH	0.05-1%			134SG	0.05-2%
Triethylamine	SMA-3	2-43					213S	1-10
Trimethylamine	SMA-3	1.7-34					105SE	2.5-50
UDMH (see Dimethylhydrazine)								
Vinyl Chloride	SVC-2M	1-20	131LB	1-20	10-128-10	1-20	132SC	0.2-6
Vinyl Chloride	SVC-6	0.05-1%	130L (DB)	1-14			132SA	0.05-1%
Water Vapor	SWA-4L	2-10 lbs/MMCF	6LLP	2-10 lbs/MMCF	10-120-20	2-10 lbs/MMCF	177UR	2-12 lbs/MMCF
Water Vapor	SWA-4	6-40 lbs/MMCF	6LP	3-40 lbs/MMCF	10-120-20	6-40 lbs/MMCF	177UL	3-80 lbs/MMCF
Water Vapor	SWA-5	0.1-2 mg/L	6L	0.05-1 mg/L	10-120-30	0.05-1 mg/L	177U	0.05-2 mg/L
Water Vapor	SWA-7M	1-18 mg/L	6	1-18 mg/L	10-120-40	1-18 mg/L		
Water Vapor	SWA-7	1-30 mg/L					177SA	1.7-34 mg/L
Xylene	SXY-4	25-1000	123	10-250	10-112-20	10-200	143SA	5-1000
<b>Smoke Generation Tubes</b>	FD-02-SMOKE	NA	500 Smoke	NA	Smoke	NA	300 Air Flow	NA
<b>Long-term Dosimeter Tubes</b>								
Ammonia	LAM-2	25-500 ppm-hr					501	5-200
Carbon Dioxide	LCD-2	0.5-12%-hr	2D	0.2-12%-hr				
<b>Dissolved Ion Tubes</b>								
Sulfide Ion	DSU-2M	0.5-20	211LL	0.5-20			200SB	0.5-10
Sulfide Ion	DSU-3	1-100	211	1-100				
Sulfide Ion	DSU-4M	2-300	211M	2-300			200SA	2-1000
Chloride Ion	DCL-4L	5-200	221LL	10-200			201SB	3-200
Chloride Ion	DCL-5M	10-2000	221L	25-2000			201SA	10-2000
<b>Charcoal Tubes</b>								
Standard Size (NIOSH Compliant)	C6X70	100 & 50 mg	Draeger 67 28631	100 & 50 mg			800B	100 & 50 mg

\* DB = Double Tube System

## APPENDIX VI. DETECTABLE COMPOUNDS

Compound	Uniphos Tube	Standard Range (ppm unless noted)
Acetaldehyde	SAT-4M	10-300
Acetic Acid	SAA-2	2.5-50
	SAG-2	2-40
	SMG-1	Qualitative
	SAC-5	50-4000
Acetone	SEO-7	0.05-3%
	SAL-5	0.01-0.5%
Acetylene	SMG-1	Qualitative
	SAG-2	2-40
Acid Gases	SMG-1	Qualitative
	SAN-4L	5-120
Acrylonitrile	SAN-4L	5-120
Amines	SMA-3	5-100
	SHY-1L	0.1-2
	SMG-1	Qualitative
Ammonia	SAM-2	2.5-50
	SAM-3	5-100
	SAM-4M	10-300
	SAM-4	50-1000
	SAM-8M	0.5-10%
	SAM-9	1-30%
	LAM-2	25-500 ppm-hr
	SMA-3	5-100
	SMG-1	Qualitative
Aniline	SAI-2	2-30
Arsine	SAR-2	1-30
Benzene	SBE-2L	0.25-12
	SBE-2	2.5-50
	SBE-3	5-100
	SEB-4L	5-150
	SHE-5L	10-1200
Butadiene, 1,3-	SBU-2M	1-20
	SBU-3	5-100
Butane	SBT-5M	50-1400

Compound	Uniphos Tube	Standard Range (ppm unless noted)
Butanol, 1-	SNB-4L	10-150
	SIB-4L	10-150
	SME-5	100-5000
Butanol, 2-	SIB-4L	10-150
	SNB4L	10-150
Butyl Acetate	SBA-6	0.005-1%
Butyl Acrylate	SBC-3L	5-30
Butylamine, n-	SMA-3	5-100
	SAM-3	5-100
Butyl Mercaptan, t-	SBM-1M	0.5-30 mg/m <sup>3</sup>
	SBM-4L	5-100
	SEM-2M	1-20
	SEM-4L	5-120
	SEM-4M	25-500
Carbon Dioxide	SMM-2M	1-20
	SCD-5	300-5000
	SCD-7	0.25-3%
	SCD-8M	0.5-10%
	SCD-8	1-20%
	SCD-10	5-60%
Carbon Disulfide	LCD-2	0.5-12%-hr
	SCS-2	2.5-50
	SCS-3	5-100
	SCS-5M	50-1600
Carbon Monoxide	SCO-3	5-100
	SCH-3	5-100
	SCO-4M	25-600
	SCO-4	50-1000
	SCO-5	100-3000
	SCO-6M	0.01-0.7%
	SCO-7	0.1-5%
	SCO-8	1-20%
	SMG-1	Qualitative

Compound	Uniphos Tube	Standard Range (ppm unless noted)
Carbon Tetrachloride	SCT-3L	1-60
Carbonyl Sulfide	SCU-3	5-100
Chloride Ion	DCL-4L	5-200
	DCL-5M	10-2000
Chlorine	SCL-1M	0.25-5
	SCL-2	2.5-50
	SCL-3	5-100
	SCL-4M	50-500
	SAG-2	2-40
	SHC-1	1-10
	SHC-3	5-100
	SNA-2M	1-20
	SMG-1	Qualitative
Chlorine Dioxide	SCI-1M	0.1-5
	SCL-1M	0.25-5
	SCL-3	5-100
Chlorobenzene	SCB-4L	10-200
Cyclohexane	SCY-6L	0.025-0.6%
	SHE-5L	10-1200
Cyclohexanone	SCE-3	2-100
Cyclohexylamine	SMA-3	5-100
Diesel Fuel	SDL-4	0.1-5 mg/L
Diethylamine	SDA-2M	1-20
	SAM-2	2.5-50
	SAM-3	5-100
Dimethylformamide, N,N-	SMF-2	2-30
Dimethylhydrazine, 1,1- (UDMH)	SHY-1L	0.1-2
Ethanol (Ethyl Alcohol)	SET-7	0.05-5%
	SME-5	100-5000
Ethanolamine	SMA-3	5-100
Ethyl Acetate	SEA-7	0.1-5%
Ethylamine	SMA-3	5-100
	SHY-1L	0.1-2

Compound	Uniphos Tube	Standard Range (ppm unless noted)
Ethylbenzene	SEB-4L	5-150
	SEB-4M	30-400
Ethylene Glycol	SEG-2	10-100 mg/m <sup>3</sup>
Ethylene Oxide	SEO-3	1-100 ppm
	SEO-7	0.05-3%
Ethyl Ether (Diethyl Ether)	SDE-6	0.04-1%
Ethyl Mercaptan	SEM-2M	1-20
	SEM-4L	5-120
	SEM-4M	25-500
	SMM-2M	1-20
Formaldehyde	SFO-3	5-100
Formic Acid	SFA-2M	1-15
Furan	SFU-6	0.01-1%
Furfural	SFL-2M	1-16
Gasoline	SGA-6L	0.03-0.6%
	SDL-4	0.1-5 mg/L
Hexane, n-	SHE-5L	10-1200
	SHE-6L	0.025-0.6%
	SDL-4	0.1-5 mg/L
Hydrazine	SHY-1L	0.1-2
Hydrocarbons	SHE-5L	10-1200
	SHE-6L	0.025-0.6%
Hydrogen Chloride	SHC-1	1-10
	SHC-2M	2-20
	SHC-3	5-100
	SHC-4	50-1000
	SAG-2	2-40
	SHF-2	0.5-30
	SSA-1L	0.5-5 mg/m <sup>3</sup>
	SMG-1	Qualitative
Hydrogen Cyanide	SHN-2	2.5-50
	SHN-3	5-100
	SHN-4	50-1000
Hydrogen Fluoride	SHF-2	0.5-30

Compound	Uniphos Tube	Standard Range (ppm unless noted)
Hydrogen Sulfide	SHS-1H	0.5-7
	SHS-1	0.5-10
	SHS-2	1-30
	SHS-3L	2.5-60
	SHS-3	5-100
	SHS-4L	10-250
	SHS-4	50-800
	SHS-5M	100-2000
	SHS-7M	0.1-2%
	SHS-7	0.5-4%
	SHS-8L	0.2-7%
	SHS-8M	0.5-10%
	SHS-9	2-40%
	SEM-2M	1-20
	SEM-4L	5-120
	SEM-4M	25-500
	SHN-2	2.5-50
	SPH-1L	0.05-2.5
	SPH-1	0.1-10
	SPH-4	50-1000
Iodine	SAG-2	2-40
Isobutylene	SEO-7	0.05-3%
Isopropyl Alcohol (Isopropanol)	SIP-7M	0.1-2.5%
	SET-7	0.05-5%
	SME-5	100-5000
Isopropylamine	SMA-3	5-100
Isopropyl Ether	SDE-6	130-3400
Maleic Anhydride	SAA-2	1-20
Mercaptans	SMM-2M	1-20
	SMM-4L	5-120
	SEM-2M	1-20
	SHS-1H	0.5-7
	SHS-7M	0.1-2%
	SHS-8L	0.2-7%
	SMG-1	Qualitative

Compound	Uniphos Tube	Standard Range (ppm unless noted)
Mercury Vapor	SHG-1L	0.1-2 mg/m <sup>3</sup>
Methanol (Methyl Alcohol)	SME-5	100-5000
	SET-7	0.05-5%
	SNB4L	10-150
Methylamine	SMA-3	5-100
	SHY-1L	0.1-2
Methyl Bromide	SMB-2M	1-18
	SMB-3	10-100
	SMB-4M	20-300
Methylene Chloride	SMC-4M	50-500
Methyl Ethyl Ketone (MEK)	SMK-6L	0.02-0.6%
Methyl Mercaptan	SMM-2M	1-20
	SMM-4	5-120
	SHS-1H	0.5-7
	SEM-2M	1-20
	SEM-4L	5-120
	SEM-4M	25-500
Methyl Isobutyl Ketone (MIBK)	SMI-6L	0.02-0.6%
Multi-gas Inorganic	SMG-1	Qualitative
Nitric Acid	SNA-2M	1-20
	SAG-2	2-40
Nitrogen Dioxide	SND-2	0.5-30
	SND-4	10-1000
	SAG-2	2-40
	SMG-1	Qualitative
Nitrogen Oxides	SNO-2M	0.5-15
	SNO-5M	100-2500
Octane	SDL-4	0.1-5 mg/L
	SHE-5L	10-1200
Oxygen	SOX-9M	3-24%
Ozone	SOZ-3	5-100
	SOZ-4M	25-500
Pentane	SHE-5L	10-1200
Phenol	SPE-2M	1-25

Compound	Uniphos Tube	Standard Range (ppm unless noted)
Phosgene	SPG-1	0.1-10
Phosphine	SPH-1L	0.05-2.5
	SPH-1M	0.3-5
	SPH-1	0.1-10
	SPH-3	5-100
	SPH-4	50-1000
	SPH-5	150-3000
	SEM-2M	1-20
	SEM-4L	5-120
	SMG-1	Qualitative
Stoddard Solvent	SSS-5M	50-8000 mg/m <sup>3</sup>
Sulfide Ion	DSU-2M	0.5-20
	DSU-3	1-100
	DSU-4M	2-300
Sulfur Dioxide	SSD-1	0.5-10
	SSD-2M	1-25
	SSD-3	5-100
	SSD-4M	20-300
	SSD-5	0.02-0.3%
	SSD-6M	500-8000
	SSD-7M	0.1-3%
	SSD-7	0.25-5%
	SCD-8M	0.5-10%
	SAG-2	2-40
	SMG-1	Qualitative
Sulfuric Acid	SSA-1L	0.5-5 mg/m <sup>3</sup>
Styrene	STO-2	2-50
Tetrachloroethane	SMB-2M	1-18
	SVC-2M	1-20
Tetrachloroethylene (PCE)	STE-3	5-100
	SCE-2M	1-16
Tetrahydrofuran	STH-4	50-800

Compound	Uniphos Tube	Standard Range (ppm unless noted)
Toluene	STO-2	2-50
	STO-4M	10-300
	SBE-2	2.5-50
	SEB-4L	5-150
	SEO-7	0.05-3%
Trichloroethylene	SCE-2M	1-16
	SCE-4L	20-250
	SCE-6	0.05-1%
	SMB-2M	1-18
	SVC-2M	1-20
Triethylamine	SMA-3	2-43
Trimethylamine	SMA-3	1.7-34
UDMH (1,1-Dimethylhydrazine)	SHY-1L	0.1-2
Vinyl Chloride	SVC-2M	1-20
	SVC-6	0.05-1%
	SCE-2M	1-16
Water Vapor	SWA-4L	2-10 lbs/MMCF
	SWA-4	6-40 lbs/MMCF
	SWA-5	0.1-2 mg/L
	SWA-7M	1-18 mg/L
	SWA-7	1-30 mg/L
Xylene	SXY-4	25-1000
	SEB-4L	5-150
	SEO-7	0.05-3%
	STO-2	2-50