TIME-WEIGHTED AVERAGE DETECTOR TUBES

NOVEL

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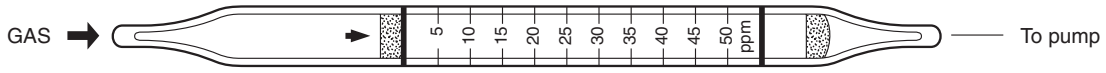
Tube No.
501

TWA-AMMONIA



1. PERFORMANCE

1) Measuring range : 5-200 ppm
(1 hr.) (8 hrs.)
10-200 ppm 5-50 ppm
2) Sampling time : 8 hrs. (8 mℓ/min.)
3) Shelf life : 1 year
4) Operating temperature : 10 ~ 30 ℃
5) Reading : Direct reading from the scale calibrated by 8 hrs. Sampling
6) Colour change : Purple → Yellow

2. RELATIVE STANDARD DEVIATION

RSD-low : 15 % RSD-mid. : 15 % RSD-high : 15 %

3. CHEMICAL REACTION

By reacting with Phosphoric acid, PH indicator is discoloured.

$2NH_3 + H_3PO_4 \rightarrow (NH_4)_2HPO_4$

4. CALIBRATION OF THE TUBE

PERMEATION TUBE METHOD

5. INTERFERENCE AND CROSS SENSITIVITY

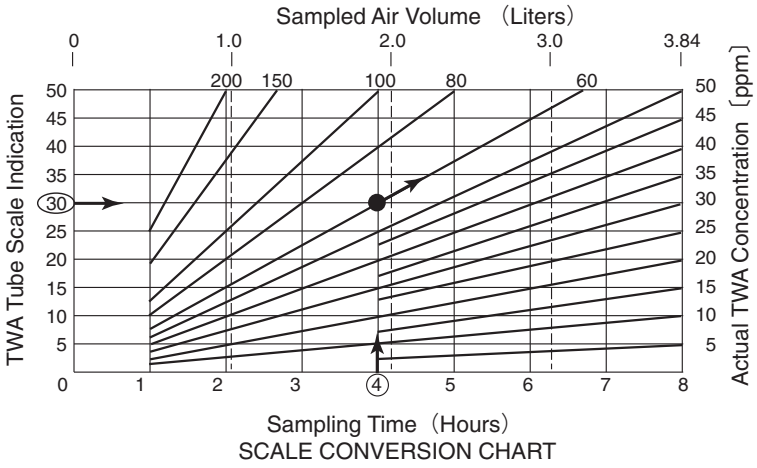
Substance	Interference	ppm	Coexistence
Sulphur dioxide		20	Lower readings are given.

(NOTE)

1) Model PM-2 personal sampler (option) ia available for this tube.
2) Flow Rate and Sampling Time
(1) In case of 8 hours, sampling with 8mℓ/min., the TWA concentration can be read directly by the scale printed on the tube at the top of Yellow stain.
(2) If the sampling duration is less than 8 hours, the actual TWA concentration can be obtained graphically from the chart provided below.
(3) If the flow rate is not 8mℓ/min, divide the scale reading by the ratio of sampled air volume to 3840mℓ.

$$\text{Actual TWA concentration (ppm)} = I \times \frac{3840}{V}$$

I = Scale reading
V = Sampled air volume in ml
[Flow rate (mℓ/min.) × Sampling duration (min.)]

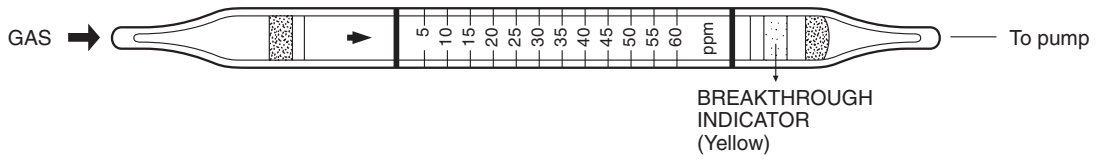


SCALE CONVERSION CHART

Example :
(a) If sampling time is 4 hours at 8mℓ/min and scale reading is 30, the actual TWA concentration is 60 ppm.
(b) If sampled air volume is 2.0 ℓ and scale reading is 5, the actual TWA concentrationis 9.6 ppm.

Tube No.
500

TWA-CARBON MONOXIDE



1. PERFORMANCE

1) Measuring range : 5-400 ppm
(0.5 hr.) (4 hrs.) (8 hrs.)
50-400 ppm 5-100 ppm 5-60 ppm
2) Sampling time : 8 hrs.(6 mℓ/min.)
3) Shelf life : 3 years
4) Operating temperature : 0～40℃
5) Reading : Direct reading from the scale calibrated by 8 hrs. Sampling
6) Colour change : White→Brown ringed

2. RELATIVE STANDARD DEVIATION

RSD-low : 15％ RSD-mid. : 15％ RSD-high : 15％

3. CHEMICAL REACTION

Iodine pent-oxide is reduced.

$CO + I_2O_5 + H_2SO_4 \rightarrow I_2$

4. CALIBRATION OF THE TUBE

STANDARD GAS CYLINDER METHOD

5. INTERFERENCE AND CROSS SENSITIVITY

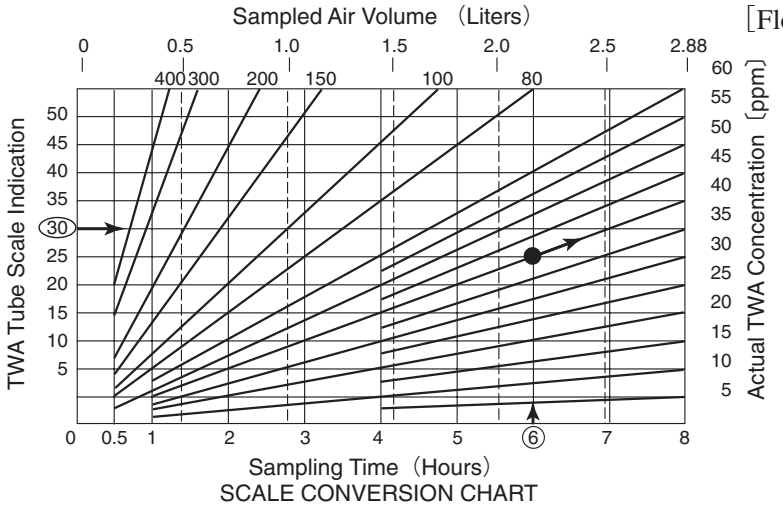
Substance	Interference	ppm	Coexistence
Butane		50	Higher readings are given.
Hexane		50	〃

(NOTE)

1) Model PM-2 personal sampler(option)ia available for this tube.
2) Flow Rate and Sampling Time
(1) In case of 8 hours, sampling with 6 mℓ/min., the TWA concentration can read directly by the scale printed on the tube at the top of Brown ring.
(2) If the sampling duration is less than 8 hours, the actual TWA concentration can be obtained graphically from the chart provided below.
(3) If the flow rate is not 6 mℓ/min, divide the scale reading by the ratio of sampled air volume to 2880mℓ.

$$\text{Actual TWA concentration (ppm)} = I \times \frac{2880}{V}$$

I = Scale reading
V = Sampled air volume in mℓ
[Flow rate(mℓ/min.) × Sampling duration(min.)]

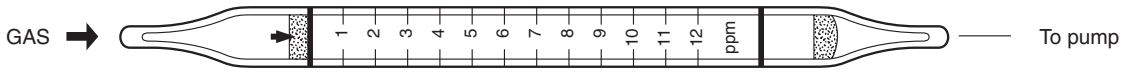


SCALE CONVERSION CHART

Example :
(a) If sampling time is 6 hours and scale reading is 30, the actual TWA concentration is 40 ppm.
(b) If sampled air volume is 1.5ℓ and scale reading is 10, the actual TWA concentrationis 19.2 ppm.

Tube No.
502

TWA-HYDROGEN SULPHIDE



1. PERFORMANCE

1) Measuring range : 1-20 ppm
(1 hr.) (8 hrs.)
2-20 ppm 1-12 ppm
2) Sampling time : 8 hrs.(6 mℓ/min.)
3) Shelf life : 1 year
4) Operating temperature : 10～30℃
5) Reading : Direct reading from the scale calibrated by 8 hrs. Sampling
6) Colour change : White→Brown

2. RELATIVE STANDARD DEVIATION

RSD-low : 15% RSD-mid. : 15% RSD-high : 15%

3. CHEMICAL REACTION

By reacting with Lead acetate(II), Lead sulphide is produced.

$H_2S + Pb(CH_3CO_2)_2 \rightarrow PbS + 2CH_3CO_2H$

4. CALIBRATION OF THE TUBE

PERMEATION TUBE METHOD

5. INTERFERENCE AND CROSS SENSITIVITY

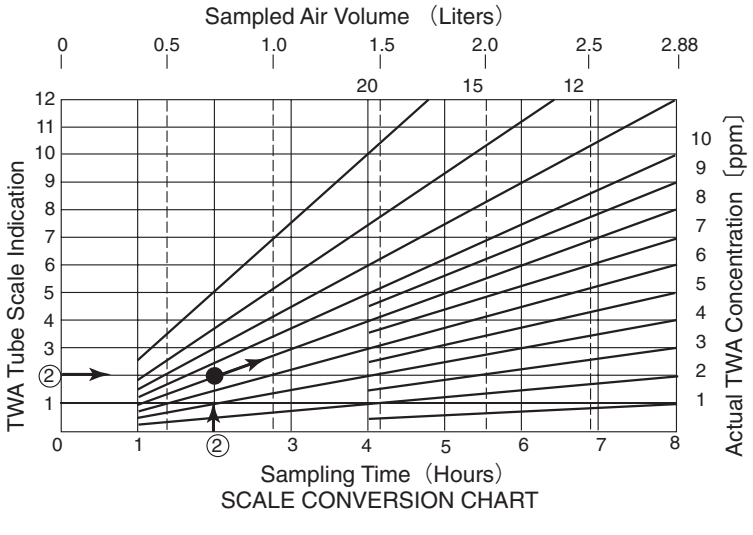
Substance	Interference	ppm	Coexistence
Sulphur dioxide		10	Higher readings are given.

(NOTE)

1) Model PM-2 personal sampler(option)ia available for this tube.
2) Flow Rate and Sampling Time
(1) In case of 8 hours, sampling with 6mℓ/min., the TWA concentration can be read directly by the scale printed on the tube at the top of Brown stain.
(2) If the sampling duration is less than 8 hours, the actual TWA concentration can be obtained graphically from the chart provided below.
(3) If the flow rate is not 6mℓ/min, divide the scale reading by the ratio of sampled air volume to 2880mℓ.

$$\text{Actual TWA concentration (ppm)} = I \times \frac{2880}{V}$$

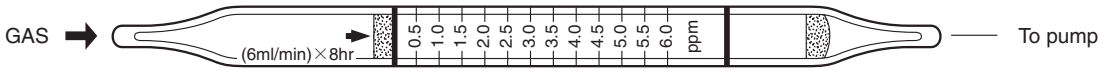
I = Scale reading
V = Sampled air volume in ml
[Flow rate(mℓ/min.) × Sampling duration(min.)]



Example :
(a) If sampling time is 2 hours at 6mℓ/min and scale reading is 2, the actual TWA concentration is 8 ppm.
(b) If sampled air volume is 2.5ℓ and scale reading is 6, the actual TWA concentrationis 7 ppm.

Tube No.
503

TWA-SULPHUR DIOXIDE



1. PERFORMANCE

1) Measuring range : 0.5-20 ppm
(1 hr.) (8 hrs.)
1-20 ppm 0.5-6 ppm
2) Sampling time : 8 hrs.(6 mℓ/min.)
3) Shelf life : 3 years
4) Operating temperature : 10～30℃
5) Reading : Direct reading from the scale calibrated by 8 hrs. Sampling
6) Colour change : Purple→Yellow

2. RELATIVE STANDARD DEVIATION

RSD-low : 15% RSD-mid. : 15% RSD-high : 15%

3. CHEMICAL REACTION

By reacting with alkali,PH indicator is discoloured.

$SO_2 + 2NaOH \rightarrow Na_2SO_3 + H_2O$

4. CALIBRATION OF THE TUBE

PERMEATION TUBE METHOD

5. INTERFERENCE AND CROSS SENSITIVITY

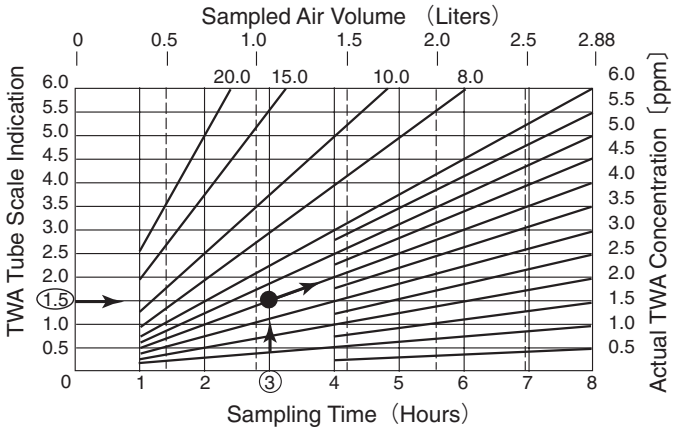
Substance	Interference	ppm	Coexistence
Carbon dioxide		1,000	Higher readings are given.
Nitrogen dioxide	Original colour is faded.		

(NOTE)

1) Model PM-2 personal sampler(option)ia available for this tube.
2) Flow Rate and Sampling Time
(1) Read the scale printed on the tube at the top of Yellow stain.
(2) Correct the reading value by average relative humidity of sampling atmosphere with humidity correction table.(Table 1)
(3) In case of 8 hours, sampling with 6mℓ/min., the corrected value by Table 1 indicates actual TWA concentration.
(4) If the sampling duration is less than 8 hours, the actual TWA concentration can be obtained graphically from the chart provided below.
(5) If the flow rate is not 6mℓ/min, divide the corrected value by the ratio of sampled air volume to 2880mℓ.

$$\text{Actual TWA concentration (ppm)} = I \times \frac{2880}{V}$$

I = Corrected value by Table 1.
V = Sampled air volume in ml
[Flow rate(mℓ/min.)× Sampling duration(min.)]



SCALE CONVERSION CHART

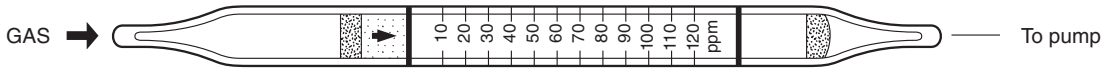
Example :
(a) If sampling time is 3 hours and corrected value by Table 1 is 1.5, the actual TWA concentration is 4.0 ppm.
(b) If sampled air volume is 2.0ℓ and corrected value by Table 1 is 3.5, the actual TWA concentration is 5.0 ppm

Table 1 Humidity Correction Table

Scale (ppm) Readings	True Concentration (ppm)						
	20%	30%	40%	50%	60%	70%	80%
6.0	4.5	5.0	5.5	6.0	—	—	—
5.5	4.1	4.6	5.1	5.5	5.9	—	—
5.0	3.8	4.2	4.6	5.0	5.4	5.8	—
4.5	3.4	3.8	4.1	4.5	4.8	5.2	5.5
4.0	3.0	3.4	3.7	4.0	4.3	4.6	4.9
3.5	2.6	2.9	3.2	3.5	3.8	4.0	4.3
3.0	2.3	2.5	2.8	3.0	3.2	3.5	3.7
2.5	1.9	2.1	2.3	2.5	2.7	2.9	3.1
2.0	1.5	1.7	1.9	2.0	2.2	2.3	2.4
1.5	1.2	1.3	1.4	1.5	1.6	1.7	1.8
1.0	0.8	0.8	0.9	1.0	1.1	1.2	1.2
0.5	0.4	0.4	0.5	0.5	0.5	0.6	0.6

Tube No.
504

TWA-TOLUENE



1. PERFORMANCE

1) Measuring range : 20-200 ppm
(1 hr.) (8 hrs.)
40-200 ppm 20-120 ppm
2) Sampling time : 8 hrs.(10 mℓ/min.)
3) Shelf life : 3 years
4) Operation temperature : 10～40℃
5) Reading : Direct reading from the scale calibrated by 8 hrs. Sampling
6) Colour change : White→Brown

2. RELATIVE STANDARD DEVIATION

RSD-low : 15% RSD-mid. : 15% RSD-high : 15%

3. CHEMICAL REACTION

Iodine pent-oxide is reduced.

$C_6H_5CH_3 + I_2O_5 + H_2SO_4 \rightarrow I_2$

4. CALIBRATION OF THE TUBE

GAS CHROMATOGRAPHY

5. INTERFERENCE AND CROSS SENSITIVITY

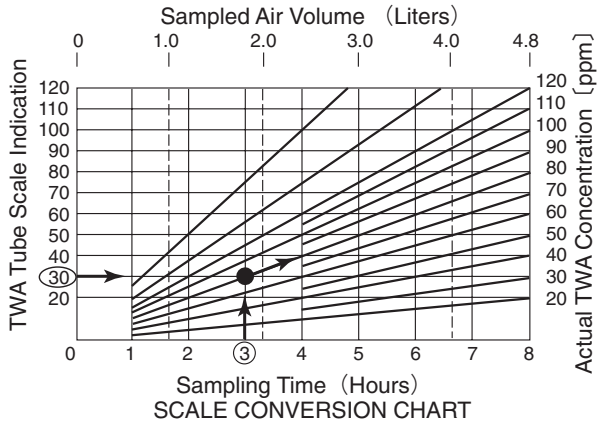
Substance	Interference	ppm	Coexistence
Acetone	Similar stain is produced		Higher readings are given.
Xylene	〃		〃
Benzene	〃		〃
Methyl ethyl ketone	〃		〃
Hexane	Whole regent is discoloured to Brown.	50	Whole reagent is discoloured and readings are not be obtained.

(NOTE)

1) Model PM-2 personal sampler(option)ia available for this tube.
2) Flow Rate and Sampling Time
(1) In case of 8 hours, sampling with 10mℓ/min., the TWA concentration can be read directly by the scale printed on the tube at the top of Brack stain.
(2) If the sampling duration is less than 8 hours, the actual TWA concentration can be obtained graphically from the chart provided below.
(3) If the flow rate is not 10mℓ/min, divide the scale reading by the ratio of sampled air volume to 4800mℓ.

Actual TWA concentration (ppm) $= I \times \frac{4800}{V}$

I = Scale reading in mℓ
V = Sampled air volume
[Flow rate (mℓ/min.) × Sampling duration (min.)]



SCALE CONVERSION CHART

Example :

(a) If sampling time is 5 hours and scale reading is 50, the actual TWAconcentration is 80 ppm.
(b) If sampled air volume is 4.0ℓ, and scale reading is 50, the actual TWA concentration is 60 ppm.